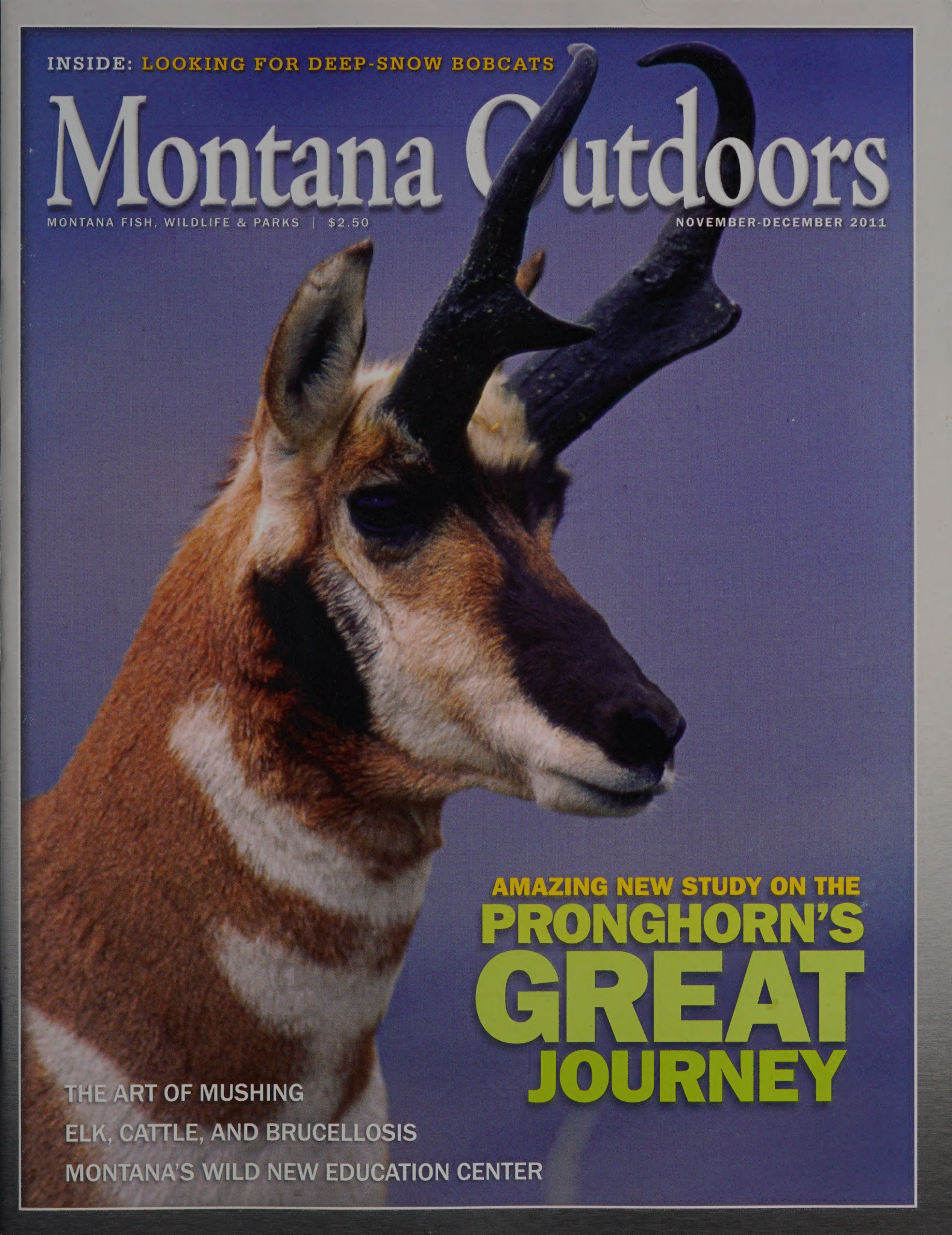
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Montana Outdoors
NOVEMBER–DECEMBER 2011

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SNOW MOBILITY A sled dog musher and his dogs compete in Montana's annual Race to the Sky. See more about mushing on page 34. Photo by Jason Savage.

FRONT COVER See page 8 to learn how researchers discovered age-old pronghorn migration routes. Photo by Mike Barlow.

About that antler article...

Do you suppose the man packing the elk rack from Montana's Gallatin Range on page 10 of the article "Coveting the Crown" (September-October) also packed the drill, bolts, wrenches, and 1- by 8-inch board that attached the skull plate to the frame? That contrived photo has no business in your magazine.

Mark Jones
Huntley

As a loyal *Montana Outdoors* reader, I feel compelled to say that I'm very disappointed by the cover of the September-October issue. One of the primary reasons I enjoy the magazine is the exceptional wildlife photography you publish in each issue. What makes your magazine unique is its commitment to authentic wildlife photography. When I pulled this issue out of the mailbox, I was appalled by the cover. Choosing a marginal photograph of a mounted deer for the cover cheapens the magazine. I understand that the story is about trophies, and I have nothing against hunting in general, but I would have expected a photograph of a trophy deer in the wild. Surely your stable of photographers could have offered a more fitting photograph from their portfolio.

Mike Clark
Parker, CO

"Coveting the Crown" is the first article I have taken issue with since I have been a subscriber. The act of hanging the head of a great game animal on the wall is a rich tradition not to be so summarily dismissed. In my house, heads are there to remind me every day of the great experience I had hunting them, as well as to immortalize the animals by having them in a place of honor. All animals killed in the pursuit of the hunt are (or should be) eaten. To then toss the head and rack in the dumpster after removing the meat would be grossly disrespectful. Where else should it go if not honored by being mounted? I have mounted the first of each of the main Montana species I have killed: antelope, mule deer, white-tailed deer, and elk. None are what would be called trophy animals, but each has a place in my heart for providing me with a wonderful experience that I can re-live every day I see it gracing my wall.

> "To then toss the head and rack in the dumpster after removing the meat would be grossly disrespectful."

Putting a 7x7 elk up there would be nice, too, but I doubt I'll ever get one. If I ever do, the wall will be a far better place to put the mount than in the trash can. Antihunters love this tradition being disparaged, as it is a step in the direction of eliminating hunting entirely.

Dick Sieminski
Bozeman

Tom Dickson responds: Mr. Jones has a good eye. We hadn't noticed that the skull plate appears to be attached to a board, and would not have run that particular image if we had.

Readers, including FWP staff members, were of mixed opinions about the cover image. Some agreed with Mr. Clark that the annual fall hunting issue should have featured a beautiful live deer or elk, as is usually the case. Others saw that a mounted deer on the magazine cover—something that has never been done before—was a provocative way to emphasize the story's main point.

Mr. Sieminski raises several good points, which he and I discussed in a series of e-mails. One thing I wanted him to know was that I do not disparage hanging animal heads on the wall. In fact, I have several in my own house. I wrote the article as a way to ask myself and other hunters why we want to kill those majestic animals and then show them off to others.

Hunting is important to me and many other Montanans. All aspects of it deserve honest and open discussion.

Taking our $5,000 elsewhere

After reading recent letters to the editor from nonresident hunters upset about Montana's nonresident license fee increases, I wanted to take their points one step further. We are a party of six from Washington State that has been hunting in Montana for 18 years. During that time I've kept records of our expenses. In recent years on our annual hunting trip to your state, we bought fuel for three trucks in Missoula for, on average, $230, had lunch there for $65, arrived in Dillon and stayed the night (three rooms for a total of $207). Dinner that first night was $90 and breakfast the next morning was $54. Then we'd go to a supermarket and buy a three-week supply of food for about $600. More fuel for the trucks and extra tanks cost $650. After we'd get our animals, we paid to have the meat butchered for around $300 total, then we fueled up again to head back to Washington at a cost of $400. Add to that another $2,500, the total cost of licenses for at least four of us, and the annual amount we spent in your state was a minimum of more than $5,000. And we were just one nonresident hunting party.

We are not returning to hunt in Montana until the price of the nonresident combination hunting licenses goes down.

Jim Lindholm
Olympia, WA

Write to us

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or e-mail us at tdickson@mt.gov.

A Booming Bottom Line

Even though the leaves are down and the grass has turned tan, many Montanans are seeing green this time of year. That's because it's hunting season, and hunting fills cash registers and boosts local economies across this entire state.

According to recent federal and state studies, hunters each year spend several hundred million dollars in Montana. Many purchases are small—$60 to fill up a truck to hunt pronghorn in Rosebud County, $17.50 for lunch in Conrad during a pheasant hunt, $28 for a box of 180-grain elk cartridges—but they add up. In 2006, according to the most recent survey by the U.S. Departments of Commerce and the Interior, 197,000 hunters (145,000 residents and 52,000 nonresidents) spent $310 million in Montana on hunting-related expenses. A 2010 FWP study found that elk hunters spent the most per day (on average $380 by nonresidents and $81 by residents), with upland hunters a close second ($376 by nonresidents and $64 by residents).

The spending supports varied occupations such as motel and cafe owners, sporting goods clerks, taxidermists, and outfitters.

All this economic enhancement is great news. But it doesn't come without some costs. FWP must manage the elk, pheasants, mule deer, bighorn sheep, waterfowl, and other game populations that hunters pay so much to pursue. Our agency needs to acquire and improve habitat. Biologists have to monitor populations and set seasons to ensure harvests aren't too high or too low. Game wardens must enforce hunting and trespass laws as well as protect public safety.

Prudently, some of the dollars spent on hunting in Montana are reinvested into the state's wildlife. Hunting license fees and a federal tax on firearms and ammunition provide most of the funding for FWP's Wildlife and Enforcement Bureaus. When you buy an elk or upland game bird license, that money goes to this agency to ensure you have wildlife to hunt, places to hunt them, and a hunting environment that is as legal and safe as possible.

Hunters spend over $300 million in Montana each year on hunting-related expenses.

Every industry has to reinvest money into what makes it thrive, and that's certainly the case with hunting. That's why Montana must continue funding wildlife management at the level required to keep up with the demand for wildlife by hunters.

Though the hundreds of millions of dollars spent on hunting in Montana is staggering, another aspect of hunting is much harder to tabulate on a spreadsheet. According to Richard Barrett, former economics professor at the University of Montana, the worth someone places on his or her ability to hunt is another type of "revenue" to Montana. It has a value, he says, that needs to be factored into any discussion of Montana's economy and standard of living.

You can say that again. Talk to Montana hunters and they'll tell you hunting is something they couldn't put a price tag on. For many people, chasing deer, elk, and other game is at the core of their identity and one of the main reasons they love living here.

This season, as many of us take to the mountains and prairies in search of game and adventure, a large part of the appeal also is to spend time afield with friends and family. Come to think of it, that could be hunting's most valuable contribution of all.

—**Joe Maurier**, Montana FWP Director

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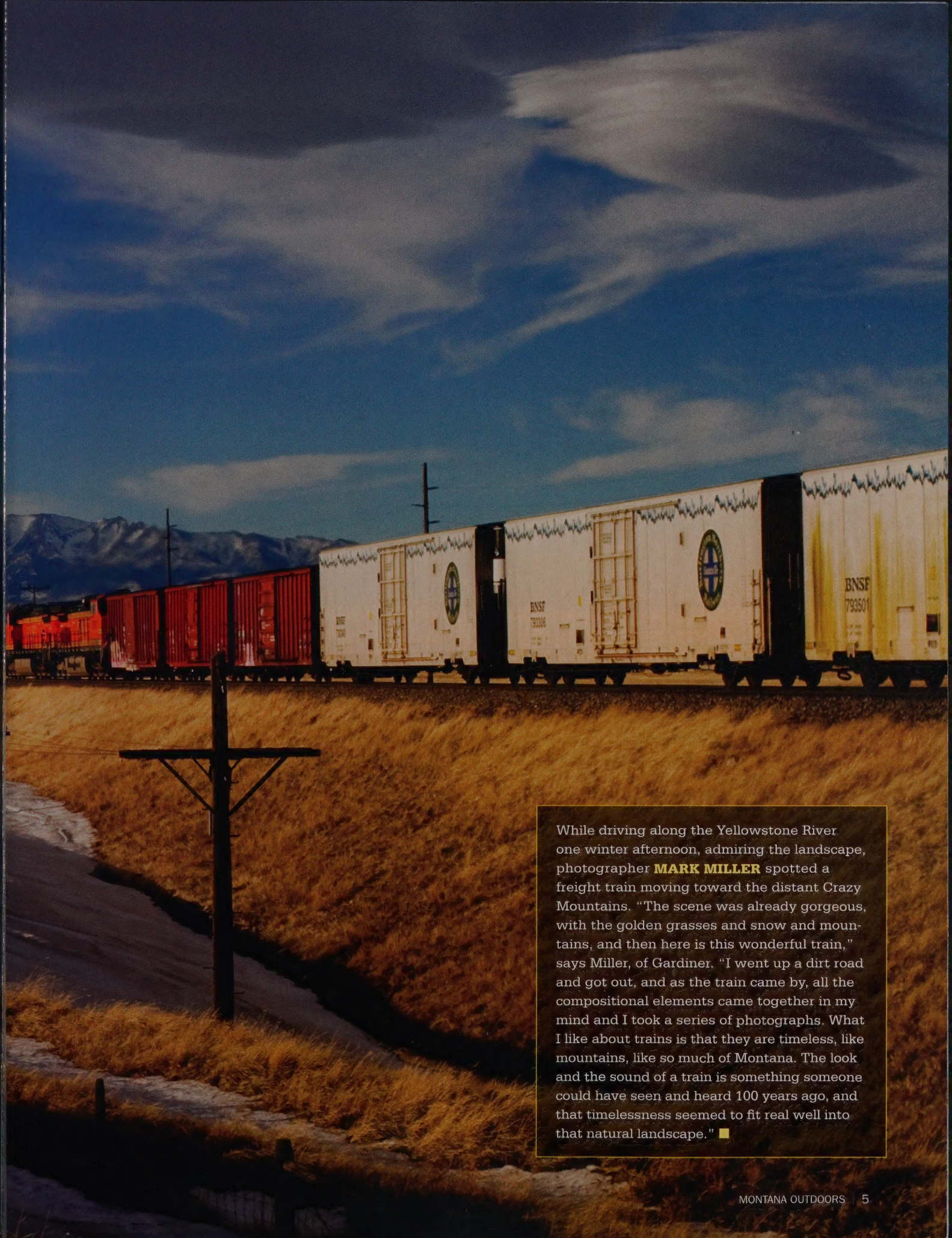


While driving along the Yellowstone River one winter afternoon, admiring the landscape, photographer **MARK MILLER** spotted a freight train moving toward the distant Crazy Mountains. "The scene was already gorgeous, with the golden grasses and snow and mountains, and then here is this wonderful train," says Miller, of Gardiner. "I went up a dirt road and got out, and as the train came by, all the compositional elements came together in my mind and I took a series of photographs. What I like about trains is that they are timeless, like mountains, like so much of Montana. The look and the sound of a train is something someone could have seen and heard 100 years ago, and that timelessness seemed to fit real well into that natural landscape." ■

The combination of low light, low flight, and wire fences can be deadly for sage-grouse during mating season.

Wire fences may be hazardous to flying sage-grouse

It's common knowledge that sage-grouse are killed by golden eagles, coyotes, and other predators. But recent studies in Wyoming, Utah, and Idaho reveal that the prairie birds also die after colliding with wire fences.

The Wyoming study focused on nearly 5 miles of fence near two large leks containing several hundred sage-grouse. During four spring mating seasons, researchers found evidence of 146 sage-grouse fatalities or "fence strikes" (sage-grouse feathers on the top barb or feather concentrations on the ground near the fence). Tom Christiansen, Sage-Grouse Program coordinator for Wyoming Game and Fish and author of the study, says the birds are susceptible during mating season because they fly only 4 or 5 feet off the ground and often before sunrise, when fences are difficult to see. He adds that sage-grouse also strike fences in winter, when they fly more frequently than in summer. "Snow limits the birds' ability to walk," he says.

Researchers then marked sections of fencing with reflective markers the size of playing cards. Marked sections reduced sage-grouse collisions by more than 60 percent.

A similar study in Idaho showed that sage-grouse collisions were six times greater on unmarked fence sections than on sections with markers.

"By no means is every fence in sage-grouse range a problem," says Christiansen. "The main concerns are those roughly within one-half mile of a lek and those that bisect areas where sage-grouse concentrate in winter."

Bruce Waage, a Natural Resources Conservation Service (NRCS) biologist who works on sage-grouse issues in Montana, says he initially had a hard time believing reports that fences kill sage-grouse. "In 35 years in the field I never saw a single instance of that," he says. But after reviewing the studies, he concluded he hadn't been looking closely enough. "If you are just driving around, you'll probably never see a dead sage-grouse by a fence or feathers in the barbed wire," he says. "But if you closely examine fences near leks, you're more likely to find evidence."

Christiansen and Waage recommend that landowners and land managers with fences near leks check for evidence of grouse strikes. "Where it looks like collisions have occurred, place—on the top wire—grouse reflectors designed to divert grouse flight," Christiansen says.

Adds Waage: "We know fences are essential for proper range management, but these markers are inexpensive and can be easily installed. And they can make a big difference for sage-grouse."

For information on an NRCS cost-share program for fence reflector tagging and deterrents that keep raptors from perching on fence posts (from which they prey on sage-grouse), contact Waage at (406) 657-6135, ext. 123, or bruce.waage@mt.usda.gov.

Wardens send kitchen black bear packing

Government gets little respect these days, but recently my husband and I witnessed employees with one state agency doing everything right, working as a team for the public's benefit.

Last July, after returning from lunch to our home in Bridger Hills, we walked into the kitchen and came face to face with a black bear. Terrified, we raced back to the garage. As my husband was hurriedly backing our vehicle out of the driveway, I struggled to call 911 because my fingers were shaking so badly. I looked up and saw a bear standing in the window of my husband's study, looking out at us. We had no idea if it was a second bear, or even a third.

FWP wardens Lloyd and Williams, in the author's house after removing the black bear.

The 911 operator connected us to FWP, and we were told to expect a game warden at the house soon. In the meantime, we drove to the nearby fire station, where three men offered to help. They returned with us to the house, opened all the doors, and the bear—there was only one—slipped out.

Game wardens Jen Williams and Brian Lloyd soon arrived. They concluded that the bear had entered by crawling through a small kitchen window left open for ventilation. "Bears are acrobats," Lloyd told us.

The bear had eaten hamburger buns, bagels, and cheese I'd left on the kitchen counter (though it ignored the Finnish crackers). In the dining room, it had deposited a pile of scat dotted with fresh chokecherries. In the living room, the wardens pointed out deep scratches on the wooden floor that indicated the bear had been frantic to get out. In my husband's study, which still had a musky stench, the bear had climbed up over a computer keyboard and gnawed at the wooden windowsill. In a spare room, it had torn down the window screens, apparently trying to escape.

As the four of us walked the outside perimeter of the house, Williams said our property was "bear safe" because we do no outdoor barbecuing and have no exposed garbage cans. (We later removed two chokecherry trees, which the game warden said bears love.) Williams also warned us that because the bear now knew food was in our house, it would likely return. She left us her cell phone number.

Thank goodness for that. An hour later, to our astonishment, my husband saw the bear on our front porch, all but ringing the doorbell to get back in.

Immediately I telephoned Williams, and it was a huge comfort that she answered personally—no putting me on hold and forcing me to listen to music when we had a potentially dangerous and unpredictable bear at our front door. From that moment, the FWP wardens operated with extraordinary efficiency. Warden Joe Knarr brought in a bear trap baited with rotten fruit and left it in our driveway. By early the next morning, what we later learned was a 120-pound bear was caged in the trap; by midmorning it was trucked off to be tagged, tested, and then released more than 100 miles away. I started breathing again—from relief and after taking Lloyd's advice to use Febreze deodorizer to get rid of the bear stench.

From the telephone dispatcher who took our 911 call, to the firefighters who volunteered to help us, to the game wardens—everyone involved took our situation seriously and acted quickly. The wardens were immediately responsive and polite, and they patiently answered our many nervous questions. We never felt abandoned or stranded alone with that bear.

Which, it turned out, might not have been our biggest concern after all. "As long as there isn't any food out, people generally don't need to be afraid of bears," Knarr told us. "It's the mountain lions you should be afraid of."

—Jo Giese, Bozeman, is a journalist whose work has been heard on National Public Radio and seen in the New York Times.

Nutritious seeds of a whitebark pine are visible after removing the cone scales.

Grim outlook for whitebark pine

The whitebark pine is in trouble, the U.S. Fish and Wildlife Service (USFWS) announced in July. But a lack of funding and dozens of other species in more immediate danger mean the federal agency cannot immediately list the high-elevation tree—devastated by pine beetles, blister rust disease, and warming climate—as threatened or endangered under the Endangered Species Act.

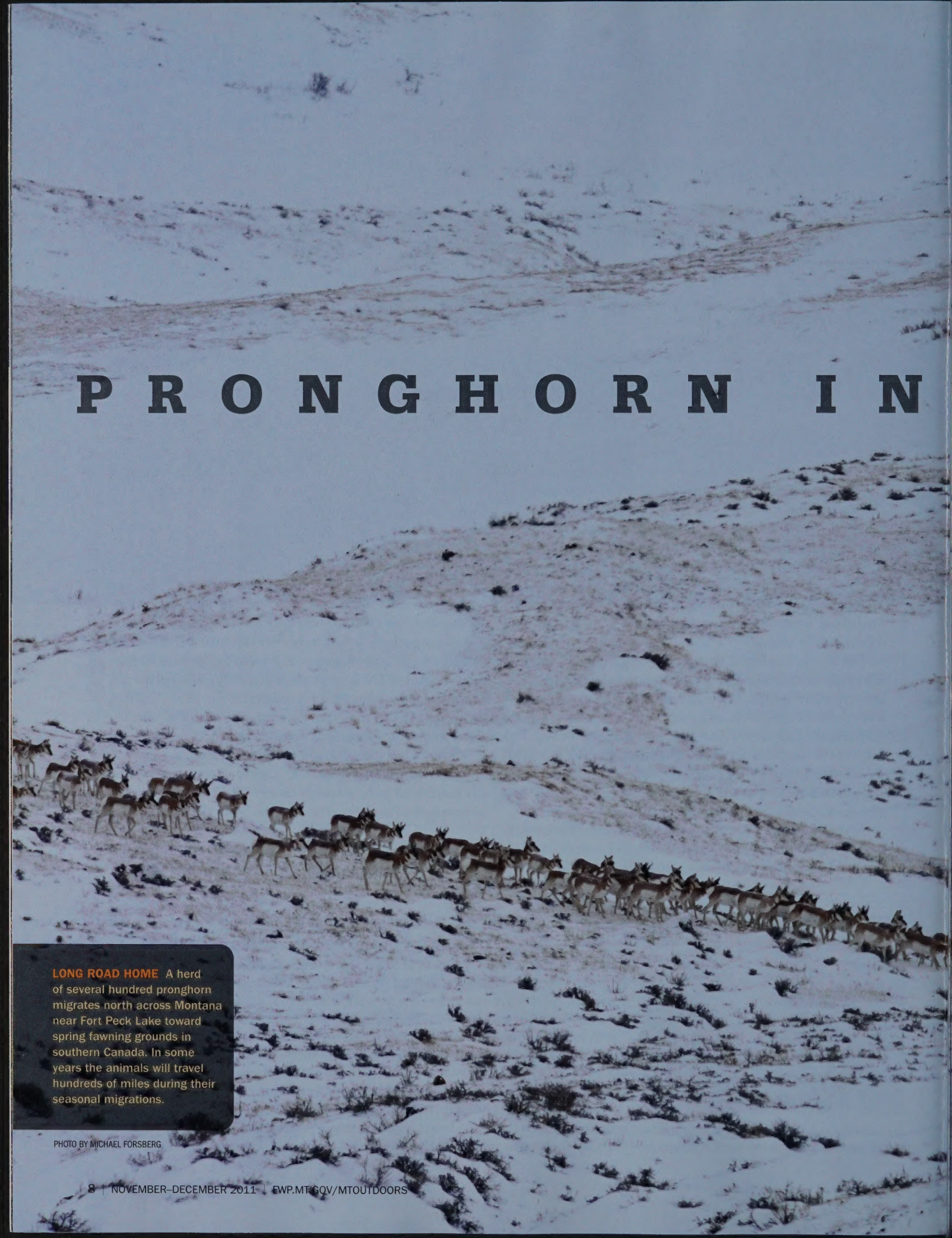
In its report, the USFWS said many studies show the whitebark pine is suffering "a substantial and pervasive decline throughout almost the entire range of the species." The agency said 70 percent of whitebark pines have died in the area around Yellowstone National Park.

Whitebark pines, which can live up to 1,000 years, produce pine nuts, an important food for grizzly bears in and around Yellowstone National Park.

In 2010, Canada classified the tree as an endangered species.

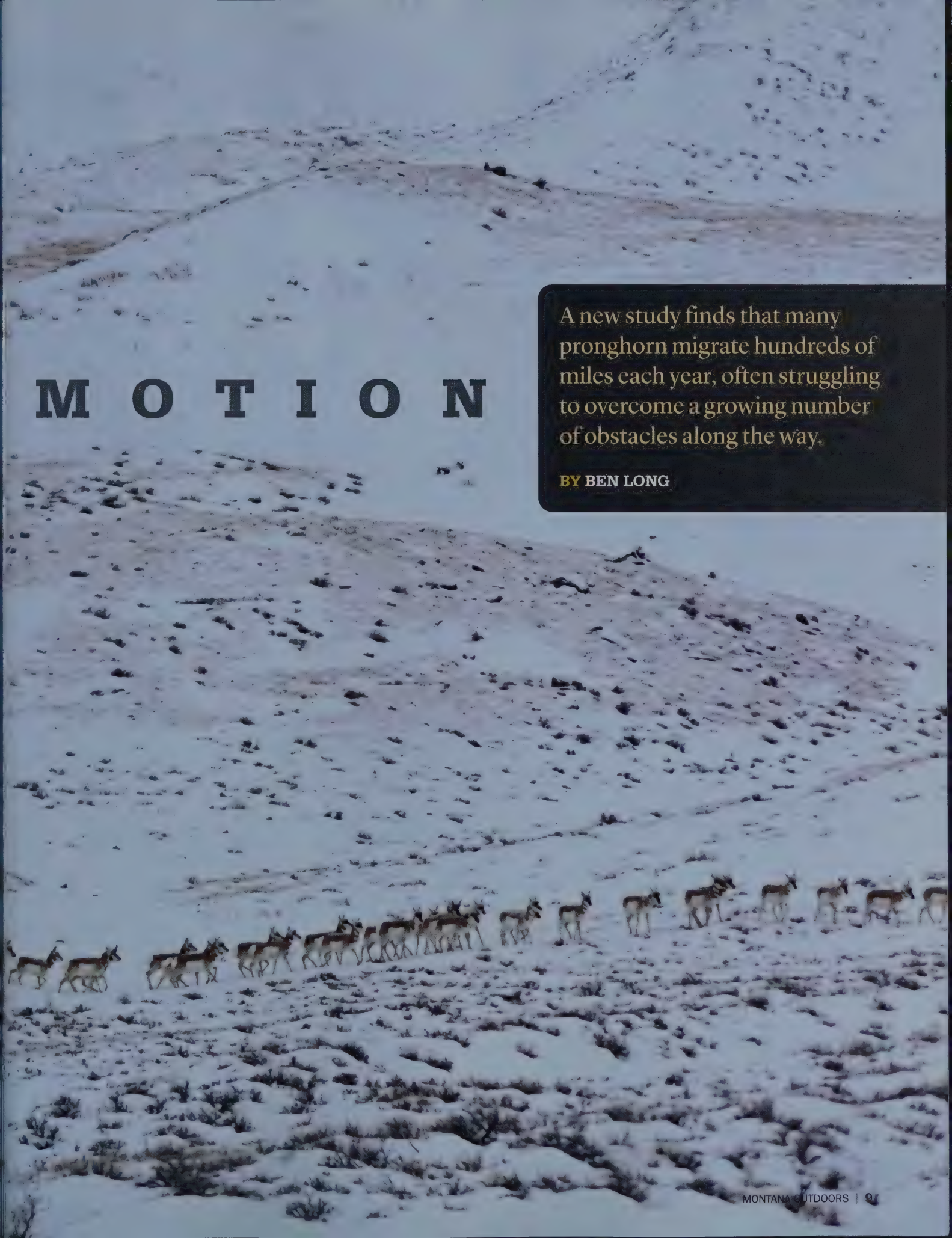
CLOCKWISE FROM TOP: BRET WALKER; JO GIESE; DON PIGOTT/USFS

PRONGHORN IN



LONG ROAD HOME A herd of several hundred pronghorn migrates north across Montana near Fort Peck Lake toward spring fawning grounds in southern Canada. In some years the animals will travel hundreds of miles during their seasonal migrations.

PHOTO BY MICHAEL FORSBERG



MOTION

A new study finds that many pronghorn migrate hundreds of miles each year, often struggling to overcome a growing number of obstacles along the way.

BY BEN LONG

Under the big sky of the high plains, a herd of pronghorn stands out amid the sage and bunchgrass, the tallest natural features along the skyline. They snap to attention the moment a truck slows, and when the vehicle stops and binoculars come out, the animals trot off over the horizon.

This vast, open country that scientists call the Northern Sagebrush-Steppe Ecosystem seems an unlikely place for secrets. But until recently, pronghorn possessed an important one—the location of core habitats and the routes they use to migrate throughout the year. Now scientists are discovering these critical summer fawn rearing areas, wintering sites, and ancient pathways along which the prairie denizens move back and forth across portions of the northern Great Plains each year. They're also finding what obstacles—natural and man-made—impede the animals' migrations. The research is timely and essential. Natural gas wells, oil pipelines, wind turbines, housing subdivisions, and other developments in northern Montana and Canada's prairie provinces continue to expand. Unlocking the secret to the pronghorn's mysterious spring and fall migrations is critical to finding ways to ensure that these age-old seasonal movements can continue.

PULLED BACK FROM THE BRINK

Though commonly called antelope, pronghorn are not related to gazelles, eland, or other true antelope species, which are native only to Africa and Asia. Pronghorn are an endemic North American ungulate, a holdover from when mastodons, ground sloths, and other ice age mammals roamed the continent. In all the world, no other species is like the pronghorn. Its closest genetic relative is, of all things, the giraffe.

Pronghorn have lived in North America for millions of years, surviving glacial eras, volcanic ash winters, and predation by the now-extinct American cheetah. But it took humans only 50 years around the turn of the 20th century to nearly wipe out the animals. After explorers and trappers opened the West, the teeming herds of wildlife observed just a few decades earlier by Lewis and Clark were quickly overrun. Ambitious pioneers punched railroads and telegraph lines across the prairie, plowing arable land and replacing hoofed wildlife with cattle. Pronghorn were shot by hungry farmers and unregulated market hunters. By the early 1900s the total pronghorn population in North America was reduced to fewer than 15,000.

Conservation-minded hunters and landowners eventually repopulated the plains with the fleet-footed animals. Working with state biologists, they trapped pronghorn in population strongholds and relocated the animals in historic habitat. Within decades, pronghorn had recolonized the American West, although in nowhere near pre-settlement numbers and only in marginalized fragments of their historic range. Today, pronghorn number over 1 million across North America. In some parts of the West they are common enough to take for granted.

Yet pronghorn populations remain vulnerable. According to northeastern Montana wildlife managers, the severe winter of 2010-11 cut populations in much of the region by 70 percent. Of more long-term concern, say biologists, is the increasing difficulty pronghorn have in making their seasonal migrations. Housing and fencing are spreading out from new subdivisions across southern

JIM MCLUCAS PHOTO COLLECTION

SPREADING THE WEALTH
A Montana Department of Fish and Game pilot hazes pronghorn into a trap on Townsend Flats near Helena in the mid-1940s. Thousands of the animals were trapped from strongholds and transplanted during the mid-20th century to restore a population that in Montana had dwindled to just 3,000.

JOE RIIS

UNFAMILIAR TERRITORY Captured by a remote-sensor camera, migrating pronghorn in northern Wyoming find easier winter walking in a river valley willow thicket. In severe winters, Montana pronghorn take similar routes through riparian areas and cattail marshes—and even onto railroad tracks and county roads—in order to move across snow-filled landscapes.

Canada. New roads, pipelines, and oil and gas wells are spreading across many parts of the northern Great Plains—from the Pinedale Anticline in Wyoming to the Bowdoin oil fields northeast of Malta to the coal-bed methane wells in southern Alberta. The resulting development pushes its way into established wintering habitat and summer grounds where pronghorn rear their fawns. Even worse, it chops great swaths of prairie habitat into isolated pieces. The resulting landscape fragmentation lessens what conservation biologists call "connectivity"—the degree to which pronghorn and other wildlife freely move from one place to another.

To find a balance between the needs of grassland wildlife and those of economic growth, western states and prairie provinces have begun to identify core habitats and migration routes so development can be sited in areas where it does the least damage and disruption. In 2008, the Western Governors' Association formed a wildlife council to learn where critical habitats and wildlife corridors would be harmed by proposed energy and housing development. The idea was to map the wildlife lands and routes so developers could modify plans in ways that protect winter range and fawning grounds as well as ensuring that landscapes remain permeable for highly mobile wildlife.

State wildlife agencies such as Montana Fish, Wildlife & Parks knew the locations of some core prairie wildlife habitats. But they lacked data on others, as well as on the routes pronghorn follow as they move between those sites. That's where Andrew Jakes came in.

In 2008, the Helena-based University of Calgary doctoral candidate began a transboundary study of pronghorn core habitats and seasonal movements in Montana, southern Alberta, and southern Saskatchewan. The study is funded by the Bureau of Land Management, the World Wildlife Fund, FWP, and the Alberta Conservation Association.

Jakes aimed to learn how human activities affect pronghorn habitat and movement across the vast region. His study required using nets shot from helicopters to capture 102 pronghorn, which were fitted with collars carrying GPS transmitters. The collars recorded each animal's position every two hours, then dropped off after one year so Jakes could collect the data and plot each pronghorn's movements on computerized maps.

Three consecutive brutal winters sent many of the research animals on historic migration treks in search of food and milder conditions, allowing Jakes to document some of the longest land migrations ever recorded in the lower 48 states. In a single year, some animals traveled more than 300 miles. One intrepid pronghorn, number 169, was tracked starting near Glasgow as it moved north to Saskatchewan's Grasslands National Park in spring. Then in fall it headed back to Montana, where severe winter weather pushed it south all the way to Ingomar—a total annual trek of more than 350 miles (see a map of the trek on page 14). "The scale of these migrations is beyond those of African wildebeest and right up there with the barren ground caribou's," says Cormack Gates, professor of Environmental Science and Planning at the University of Calgary.

HARD GOING Historically able to follow bison herds that acted as snowplows, pronghorn now must break trail themselves. The animals are ill equipped to negotiate drifts like those that piled up across northern Montana this past winter. In any year, fences pose constant problems. If pressed, pronghorn can leap over obstacles, but they have not evolved to do so easily, as elk and deer have. In winter, they squander precious energy trying to bypass fences.

SIMILAR TO DUCKS

Jakes's findings confirmed what wildlife managers had long suspected. Rather than manage pronghorn like homebody species such as white-tailed deer, which can live their entire lives within a square mile or two of where they are born, pronghorn may require management similar to that used for migratory waterfowl.

Ben Long is a freelance writer in Kalispell.

LEFT TO RIGHT: JOE RIIS; JOE RIIS; CHRIS BOYER; JOE RIIS

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Decades ago, waterfowlers and biologists learned that ducks often travel vast distances, many nesting in Canada's prairie pothole region then wintering in the warm wetlands of Mississippi, Louisiana, and Texas. By putting leg bands on ducks and tracking where the birds were shot by hunters, biologists began mapping waterfowl migratory routes, along with prime wetlands for nesting and overwintering. Also documented were critical resting and refueling "stopover" sites, such as shallow temporary wetlands. Private conservation groups such as Ducks Unlimited, along with state, provincial, and federal wildlife agencies, began protecting, conserving, and restoring critical waterfowl habitats in the United States, and even more so in Canada.

Pronghorn appear to require a similar transboundary approach. Jakes found that some pronghorn are "resident," meaning they stay within a relatively small home range year-round. But, like flocks of ducks and geese, many pronghorn head south in fall seeking more accessible food. Then, like waterfowl, the migrants return north in spring to raise their young. Justin Gude, head of wildlife research for FWP, says the findings underscore the need for wildlife managers in Montana, Saskatchewan, and Alberta to work together more cooperatively and pay attention to habitat conditions on both sides of the border. "If we want to manage for pronghorn hunting in northern Montana, we can't just look at where the animals live during the hunting season," he says. "We have to also consider what's happening hundreds of miles away in Canada."

Just as important as conserving core habitats is maintaining pronghorn migration corridors. "Ducks can fly over the tops of most barriers," says Gates. "But pronghorn have to put their foot in every little bit of their path. So what happens on the landscape is critically important."

> "Pronghorn have to put their foot in every little bit of their path. So what happens on the landscape is critically important."

TRAIN WRECKED Deep snow forces pronghorn to travel along railroad corridors. Last winter hundreds of pronghorn trying to migrate along tracks were killed by trains in northeastern Montana, such as this section of line northwest of Glasgow. Cars and trucks are no friendlier. As human development grows across the northern Great Plains, so do highways and collisions between migrating pronghorn and moving vehicles.

BLOCKING THE WAY

A major impediment to pronghorn survival is deep snow. The animal's tiny hooves, perfect for running, are nearly useless for digging through snow to reach forage. In centuries past, pronghorn followed bison in winter, using the herds as snowplows for easier passage and to find food. But these days many pronghorn are forced to search for river bluffs and ridgetops, where prairie winds scour snow from patches of vegetation. Often that means heading south.

Some of the study pronghorn that summered in south-central Saskatchewan and Alberta headed to Montana when the weather turned cold. The pronghorn gathered in herds of up to 1,000 animals and moved south, conserving energy as they moved through deep snowfields by walking in single file. Winter storms turned some of the migrations into forced marches, pressing pronghorn to walk up to 30 miles a day. In early 2011, blizzards pushed many herds over frozen Fort Peck Lake and even farther south to Montana Highway 200 and beyond.

Other obstacles to pronghorn movement include roads, traffic, and new construction. In Alberta and Saskatchewan, conversion of

A LONG, WET CROSSING Last spring, pronghorn trying to return to Canada were stymied by massive Fort Peck Lake, which they had crossed months earlier when the reservoir was frozen. Many tried to swim across the vast reservoir. Some made it (facing page, below right), but many did not.

prairie into farmland, housing developments, and energy fields has already pushed sage-grouse there to the edge of local extinction. In northern Montana, energy development is growing too. Developers have drilled more than 1,500 natural gas wells in northern Phillips County, oil development from the Bakken oil field along the North Dakota border is expanding, and hundreds of coal-bed methane wells have popped up across Montana's southeastern corner.

Throughout the northern Great Plains, fencing has long vexed a prairie mammal that evolved to negotiate barriers no taller than a sagebrush. Though pronghorn can jump wire fences, they do so reluctantly, preferring to crawl under. But they often get snagged on the bottom barbs, or can't slip under when snow is more than a foot deep. Most impenetrable are woven wire "sheep fences," which extend to the ground. During fall and spring migrations, pronghorn squander precious energy wandering up and down fence lines in search of a way through. In some cases, Jakes found that his research pronghorn spent hours trying to get past a single fence. "Just think how much time and energy those animals have to spend negotiating 30 or 40 fences in the middle of winter during a migration," he says.

Now finished with his field work, Jakes is analyzing the gigabytes of data he gathered. By next spring he'll know more about how various types and densities of roads, gas wells, and other developments affect pronghorn habitat and movement.

Some land managers have already begun putting his study results to use. Recently The Nature Conservancy of Montana used the migratory pathway data to find where fences on their conservation holdings need to be modified to enable pronghorn movement.

Record route

The 350-mile trip (pink dots) of pronghorn #169, February 2010 to February 2011.

MONTANA OUTDOORS, SOURCE: FWP

Losing essential migrants

Andrew Jakes, who is conducting one of the largest pronghorn studies ever done in North America, wonders if human development may eventually rob some pronghorn populations of essential migratory traits.

Jakes says some pronghorn in his study population are "residents" that stay in the same relatively small home range year-round. Others are migrants that move south in fall to find better forage in winter range before returning north in spring to rear their young. "No one knows why an animal chooses one strategy over the other," he says. Scientists suspect that the combination is an evolutionary adaptation that allows populations to endure under widely varying environmental conditions: Migrants survive harsh winters while residents do best in milder ones. Losing either strategy could doom a population over the long haul.

Jakes with a GPS collar.

Southern Saskatchewan and Alberta are the northern periphery of the pronghorn's continental range. Historically, migrant pronghorn in those areas moved south each fall into today's northern Montana to survive winter. During severe winters they moved even farther, as shown in the great treks Jakes documented in his recent three-year study. Before European settlement, the long-distance migrants could easily return to Canada in spring. "It's not that easy anymore," Jakes says. Incremental, cumulative developments on the prairie landscape—from Fort Peck Lake, built 70 years ago, to a gas well built last summer—make life harder for pronghorn moving between essential core habitats.

Jakes notes that 3,000 pronghorn that crossed frozen Fort Peck Lake last winter were stuck months later on the reservoir's south shore, urged northward to Canada by instinct, but blocked by miles of open water. What's more, the lacework of fencing that the animals negotiated as they fled south added another layer of obstacles for the return trip. "A big concern is that, over time, southern Alberta and Saskatchewan would not only lose their resident pronghorn in severe winters but also a large percentage of their migratory pronghorn that can't return because of barriers," Jakes says.

Some biologists believe that knowledge of when and where to migrate is passed down each generation from does to fawns. If so, essential migratory traits could slip away from a population that loses too many migrating does during a string of severe winters, causing the population to fizzle out. "Migration is an essential evolutionary survival strategy, and we don't want pronghorn to lose that ability," Jakes says.

—Tom Dickson

Mark Sullivan, FWP wildlife manager in Glasgow, says Jakes's findings emphasize the need for agencies, highway departments, landowners, and conservationists on both sides of the border to redouble efforts to make more room for the mobile prairie travelers. He and other wildlife managers, as well as local, state, and provincial planners, say they will be using data from the study to identify existing migration barriers, potential barriers, and bottlenecks. In time, the information will be shared with ranchers, transportation departments, and the energy industry to make sure economic growth considers and addresses the needs of wildlife. "People are finally starting to learn about the core habitats pronghorn use and the migration routes they take," Sullivan says. "That will make it a lot easier to adjust human development in ways that help these animals survive."

CLOCKWISE FROM TOP LEFT: MICHAEL FORSBERG; WINSTON GREELY/FWP; MICHAEL FORSBERG

FISHING IN SNOW ON THE MADISON

BY **VERLYN KLINKENBORG**

I am kneeling in the silt at the edge of the Madison River, halfway down the Madison Valley north of Yellowstone Park. The afternoon light is dropping, and the clouds hover just above the asphalt on the highway across the river. Snow is coming down hard, skidding upstream as if it were falling in horizontal threads. I am casting a trout fly no bigger than a snowflake, letting the wind carry it above the fish—rainbows and browns—that are feeding in the shallows in front of me.

Surely the brain should shut down at a time like this. My fingers stopped working a while ago. I've been on my knees for an hour, inching forward, catching and releasing a fish now and then. Stealth made sense when I started, when there was still light in the sky, when it was possible to imagine a creature from one element—water—being spooked by a creature from another. But now we are all one element—snow, river, me, fish, wind, cold, even the road-killed deer up on the highway, where the ravens and magpies, and a lone coyote, have settled in for a feast.

I have come again to the why moment. I suspect it may be the reason I fish. I cast, and yet I hope I won't hook another trout, because it would mean even wetter, colder hands and the trouble of drying the fly and, probably, tying a new knot. Fly-fishing means eliminating all the variables—what fly you choose, what cast you make, how you approach—until you solve the single, irreducible event that is happening in front of you: the head of a trout taking a mayfly from the water's surface. For me there are no variables left. I am no longer up to problem-solving. The cold has reduced me to a single hypothesis, which the trout are now rejecting.

That's when I wonder, why am I here? Is there a more pointless act than catching a fish I intend to release as quickly as I can? I do my best, in the rest of my life, to keep the question of pointlessness at bay. But here on my knees in the mud and the snow, numb to the bone, it's safe to let it fly. Almost safe, that is. In the afternoon light the river is as black and white as the bald eagle I saw sitting on a fence post down the road. The trout slash at the surface, big trout. And yet for a few minutes the only thing in the landscape that makes no sense is the angler. I've lost the thought that brought me here. There's a vertigo in the snowstorm, and I've somehow let it inside me.

The snow has muffled the roar of the trucks on the highway, but the sound of the river is as clear, as liquid as ever. An hour ago, the grasses on the river's edge were bright as lichen. The snow falls thicker and thicker still, and I remind myself that the weather could not be better for fishing. The dark sky, the snow, the time of year, the hatching mayflies—they all do a better job of explaining my presence than I can. They posit an angler and, for better or worse, that angler is me. My reasons make no difference. I am part of this irreducible event, and that will have to be reason enough.

After a while, the river does what it always does. It wears my thinking away to nothing. The vertigo lifts. I stop casting and sit back on my heels and watch the Madison fret itself to pieces and then reunite in a single flow. The angler is supposed to be one with the stream, but in my experience he never is. He is always caught in the human comedy of self-justification, always opening the philosophical space that no other creature seems to require, toting around his reasons.

I suppose I go fishing in the hopes that one day I will fish as intently as the trout that is even now rising to the mayfly. But then I am just supposing.

Verlyn Klinkenborg, who lives in upstate New York, writes for many publications, including the New York Times, *in which this essay originally appeared. Used with permission.*

TROY DAZZLER

Studying Bobcats in Lynxland

A research scientist tracks common wild cats rarely found in deep-snow habitat.

BY TIM GIBBINS

Early on a cold January morning, research biologist Roberta Newbury loads packs, shovels, snowshoes, radiotelemetry equipment, and other gear onto a pull-behind sled, while her research assistant, Jodi Berg, starts two snowmobiles. The two then climb onto their snow machines and head up a snow-packed U.S. Forest Service road into the predawn darkness.

And so it has gone for Newbury over the past four winters, morning after morning, across the Flathead National Forest near Whitefish. At first her search was for Canada lynx tracks as part of a PhD research project at the University of British Columbia Okanagan. But after two winters and more than 3,000 miles back and forth across the Tally Lake Ranger District on snowshoes, snowmobiles, and skis, she didn't find a single set of lynx tracks (though lynx were reported elsewhere in the Flathead National Forest). What Newbury unexpectedly found instead were bobcat tracks nearly everywhere she went. "Deep snow is supposed to be the domain of lynx, not bobcats," she says. So Newbury switched gears. She is now studying the smaller felines, focusing on their movements and daily energy requirements in deep snow.

Bobcats are a common wild cat found throughout Montana, though typically not in the forested mountains of the state's northwestern region. They weigh 15 to 35 pounds, about twice the size of a house cat, with gray or reddish fur marked with black spots and a bobbed tail black on top and white underneath. Canada lynx, a federally threatened species, are found primarily in the state's western mountain ranges. They average around 25 to 40 pounds and are characterized by large paws that act as snowshoes, long legs, a large facial ruff, and a completely black bobbed tail.

Tim Thier, Montana Fish, Wildlife & Parks wildlife biologist in the state's northwestern corner, says FWP and other conservation agencies in the Northern Rockies will use Newbury's field data to better understand bobcat movement and home ranges and improve management of the species. "Other than what we get from annual winter track surveys and information required from trappers, not much data has been gathered on bobcats over the past 25 years," he says. "As far as I know, a study of bobcats in deep snow has never been done, so this is some really important work."

Newbury's research requires her to live-trap bobcats and outfit them with collars containing GPS satellite transmitters. Every three hours, the collars record the date, time, location, and direction the bobcat is traveling. "This data gives us a better idea of how bobcats use their home range and how they interact with their landscape," she says.

Thier, who helps Newbury on the bobcat study, says the satellite technology allows scientists to learn about the movement and behavior of bobcats and other wildlife far more quickly than in years past. "Using older radiotelemetry, we'd be lucky to obtain 20 to 30 locations from a captured animal over the course of an entire field season," he says. "Now Roberta is getting that many locations in two or three days. She's able to learn how big their home ranges are, and

WHERE, KITTY? Research assistant Jodi Berg using a radiotelemetry receiver to track a radio-collared bobcat north of Whitefish.

WHAT ARE YOU DOING HERE? Little is known about bobcats in deep-snow environments, not their usual domain. Over the past few winters, doctoral candidate Roberta Newbury (right, with a tranquilized bobcat) has tracked the wild cats to study how the animals use snowy habitat. She has also analyzed stomach contents of carcasses brought in by licensed trappers to see what the cats eat.

even record where a bobcat is at night, which was pretty much impossible before GPS technology came along." Thier adds that research scientists still use radiotelemetry to locate animals in real time.

Bobcat populations in western Montana have been thriving over the past two decades, despite increasing interest by trappers to harvest the animals, whose pelts now fetch up to $600. One reason for the abundance, Thier says, is that Montana manages the wild cats conservatively, erring on the side of bobcat populations when setting regional trapping harvest quotas. In addition, regional trapping districts are closed as soon as a quota is reached—which in recent years has been within the first three weeks of the two-month season that begins December 1. "In the 1980s and early 1990s, trappers had a tough time finding bobcats," says Thier. "Maybe our restrictive quotas and season closures are, in the long run, providing for a healthier population."

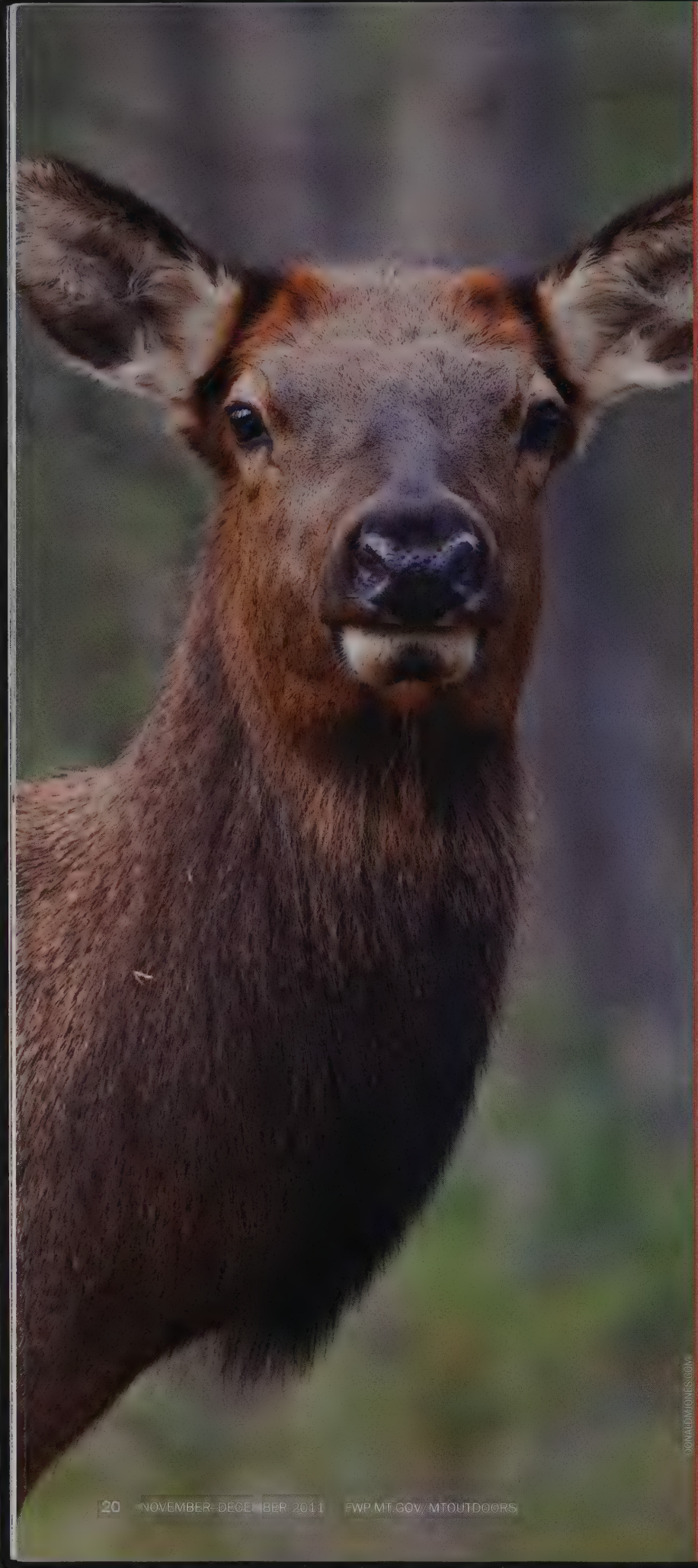
Tim Gibbins is a writer in Portland, Oregon.

In addition to tracking bobcat movements and habitat use, Newbury is conducting the first scientific assessment of the bobcat's winter diet in northwestern Montana. She analyzes bobcat scat and conducts necropsies of bobcat carcasses collected from local trappers during the winter trapping season to examine stomach contents. So far, she has found mostly the remains of squirrels and woodrats, as well as some snowshoe hares, which lynx prefer.

On this winter morning, Newbury and Berg are checking box traps to see if any hold a bobcat. The first is empty except for the roadkill deer leg used as bait, but they have another eight to check along a 15-mile loop of U.S. Forest Service roads. After testing the trap mechanism to ensure the door shuts when triggered, they fire up the snowmobiles and move on.

As they reach the seventh trap of the day—coming up short on the other six—Newbury peers in and shouts, "We got one!" The bobcat hunkers at the back of the cage until approached, then lunges at the door, showing its fangs and puffing up its face fur to appear larger. It turns out Newbury knows this cat. She'd been tracking the young male since capturing it as a kitten two years earlier. Just two weeks ago she had removed the bobcat's radio collar. "We have all the information we need from this fellow," she says, opening the trap door so it can escape. The cat remains in the cage until the researchers back away. Then it dashes from the trap entrance, jumps over a frozen creek, and climbs the timbered slope. After looking over its shoulder once, it melts into the snow-covered forest.

LEFT TO RIGHT: ROBERTA NEWBURY; JAIME AND LISA JOHNSON; TIM THIER/FWP



KEE
THEM

How Montana is working to redu
transmission from elk to cattle

BY SCOTT

Close your eyes and say two words: "brucellosis" and "wildlife."

Chances are, bison appear on the back of your eyelids. After all, the possibility of diseased bison infecting Montana's cattle herds—and the various reactions to it by state officials and the livestock industry—has dominated headlines for nearly three decades.

But think again. Over the past several years in Montana, Idaho, and Wyoming near Yellowstone National Park, animals in nine cattle herds and two domestic bison herds tested positive for the infectious disease. Scientists say the most likely source of the infections is not wild bison; it's elk.

In recent years, growing numbers of elk in southwestern Montana have tested positive for exposure to the disease. These "seropositive" elk, as they are called, aren't necessarily infected with brucellosis or infectious to other animals, but they do harbor antibodies indicating exposure to the disease. The elk have been discovered increasingly farther from Yellowstone National Park, considered the last reservoir of brucellosis in the United States. The wild ungulates mix with cattle primarily in late winter, when they move down from deep snow in high elevations searching for snow-free forage.

A bacterial disease, brucellosis can cause pregnant cattle, bison, and elk to abort their calves. It spreads primarily through contact with infected birthing material, which both wild and domestic animals lick and eat.

Montana Fish, Wildlife & Parks has embarked on an ambitious five-year plan to learn more about

PING APART

e the growing risk of brucellosis the Greater Yellowstone Area.

CMILLION

how widespread the disease has become in elk, how it affects the animals, how they might spread the disease, and possible threats to elk herds and Montana's beef industry.

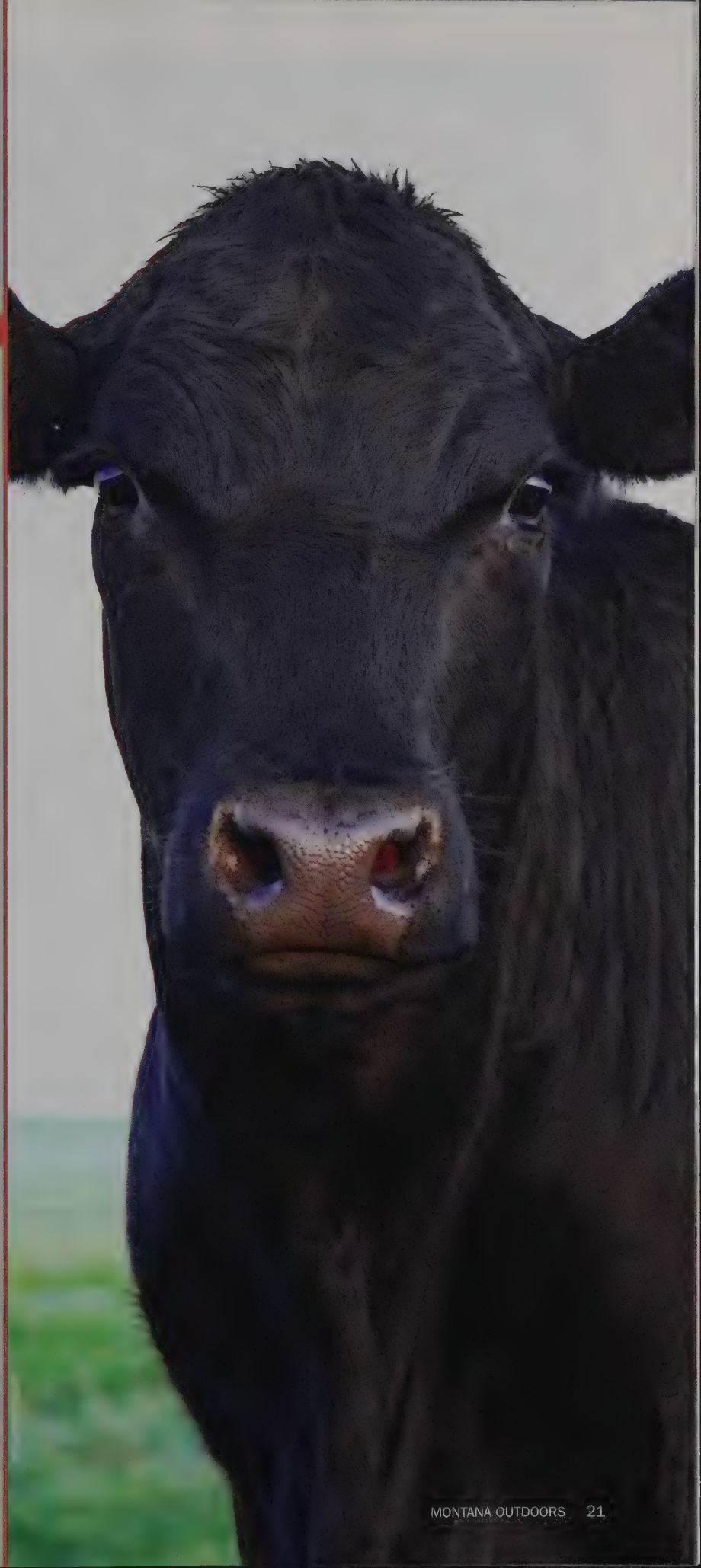
The research is difficult and expensive. It starts with a helicopter, a stout net, GPS radio collars, and other high-tech tracking equipment. Results will depend on hard work and finding enough money to complete the task. But because there's a lot at stake, FWP officials say the agency is committed to seeing the project through.

FOLLOWING THE ELK

Neil Anderson, who runs FWP's laboratory in Bozeman, department veterinarian Jennifer Ramsey, and wildlife research biologist Kelly Proffitt designed the elk brucellosis study to answer questions. And there's no shortage of them: How often do seropositive elk abort? Do they shed the bacteria into the environment during a normal birth? What contributes to increasing seroprevalence in elk? What are the risks to cattle? What are the best ways to reduce risk? And perhaps most important: How widespread are seropositive elk in Montana's portion of the Greater Yellowstone Area, and why is their range expanding? "We're seeing brucellosis in areas where ten years ago we didn't think we'd see it," Anderson says.

Anderson and other agency scientists hope the study, which costs roughly $300,000 a year—and is funded for now by the U.S. Department of Agriculture (USDA)—will shed light on these questions and more. Here's how it works:

Last winter, in southwestern Montana's Ruby



FOLLOW THE BACTERIA FWP's five-year study began last winter in the Ruby Valley, where helicopter crews (top) captured 100 cow elk and transferred each animal to a staging area (1). There, biologists tranquilized the elk and drew blood samples. In a nearby ice-fishing tent (2), set up to keep equipment warm, blood serum was tested for the presence of the brucellosis antibody, indicating exposure to the disease. These "seropositive" elk were then fitted with GPS and radio collars, as well as vaginally implanted transmitters (VITs) on the pregnant animals. Biologists then released the elk (3) and followed the animals via signals picked up from portable radio receivers (4). At sites where births or abortions took place, biologists collected tissue samples from afterbirth. One of the study's goals is to learn the proportion of seropositive cow elk that leave brucellosis bacteria behind.

Valley, a skilled helicopter crew captured 100 cow elk, one at a time, using a powerful gun that shoots a large net over the animal. Once hobbled and blindfolded, each elk was carried in a sling beneath the chopper to a staging area, where an FWP crew went to work. Crew members drew and tested blood to see if the animal had been exposed to brucellosis. Anderson and Ramsey conducted the analysis in a nearby ice-fishing tent to keep the blood-testing equipment warm enough to function. Of the 100 captured elk, eight tested positive for exposure in the field tests (at a laboratory, blood from an additional four later tested positive). Elk testing positive in the field were also checked to see if they were pregnant.

The first eight seropositive elk were fitted with GPS collars. These collars, along with those put on 23 other elk, also contained radio transmitters so the animals could be located, captured, and tested again later. Pregnant collared elk were also fitted with vaginally implanted transmitters (VITs), which produce a signal when the mother gives birth or aborts the fetus. When field technicians heard that signal last spring, they hurried to the area to find the spot where the birth or abortion took place. They swabbed the discharged VIT and collected any tissue samples found from afterbirth. Analyzing this and similar samples over the next several years will help them determine, among other things, the proportion of seropositive cows that leave afterbirth containing the brucellosis bacteria.

The GPS collars, which record the locations of elk every half hour, are programmed to release after one year. Scientists will locate the dropped collars and plot the stored data on computer maps to see where elk travel, especially during late winter and spring when brucellosis-induced abortions are most likely. "One thing we want to learn is whether conditions such as elk group densities on winter range result in higher seroprevalence rates, and then figure out if we can do anything about it," Anderson says.

ERADICATED, ALMOST

Americans have been trying to figure out what to do about brucellosis ever since the disease arrived from Europe more than a century ago and spread among cattle. Before

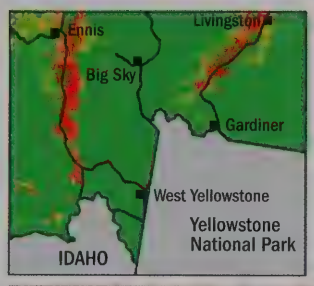
ALL PHOTOS: FWP

widespread milk pasteurization, brucellosis was a significant public health threat. It made people seriously ill, with joint pain and recurring fever.

Accordingly, the federal government decided before World War II to eradicate the disease from the United States. After decades of work and many millions of dollars, brucellosis has been almost entirely eliminated from this country's cattle herds. In addition to protecting public and livestock health, the near-eradication means that ranchers don't have to conduct expensive and bothersome testing when they sell breeding animals across state lines.

To ensure brucellosis remained at bay, the eradication effort, led by the USDA's Animal and Plant Health Inspection Service (APHIS), created a huge system of rules and regulations. The regulations (recently modified by APHIS) required that if cattle tested positive for exposure to the disease in two separate herds over 12 months, the USDA could revoke a state's "brucellosis-free" status. That would require every cattle grower statewide to test for the disease before shipping breeding cattle out of state, adding costs and reducing marketability. In addition, every animal in the infected herd had to be slaughtered, even if only one cow tested positive.

The last major reservoir of brucellosis is in elk and bison living in and around Yellowstone National Park. There's never been a documented case of bison transmitting brucellosis to cattle in field conditions. That's likely not the case with elk. Strict management programs keep wild bison and livestock separate as much as possible. But maintaining segregation is much harder with elk, because they are more numerous, wander farther, and easily hop fences. Their mobility also makes elk harder to locate—and thus keep separate from cattle. That's where the new FWP study comes in.



RISKY BUSINESS In maps made available to ranchers and the Montana Department of Livestock, FWP scientists compare the probability of elk using parts of the Greater Yellowstone Area with potential cattle grazing areas to develop maps like this one. It shows the relative probability (red for high, yellow for medium, green for low) of elk and cattle mixing during late winter and early spring.

> "If we can't eliminate brucellosis in wildlife—which we feel pretty strongly we can't—then we need to manage around it as a long-term endeavor."

Until recently, FWP scientists learned the whereabouts of seropositive elk mainly by testing blood samples collected by cooperating hunters. Since the early 1980s, the department has tested roughly 8,600 samples. The samples have come primarily from the Gardiner and Madison Valley areas, which provide winter range to elk that summer both in and outside Yellowstone. The tests showed that on average about 2 percent of elk in the areas were seropositive (compared with about 50 percent for bison). But in recent years, the exposure rate has spiked: 8 percent to 12 percent in the Gardiner area and 5 percent to 12 percent in the Madison Valley. And now seropositive elk are showing up in the Ruby Valley to the west.

Earlier, researchers had assumed the disease was spreading within Yellowstone area elk herds through occasional contact with bison in and around the park. Or infections came from elk that had wintered on several feed grounds in Wyoming, where thousands of the animals congregate in artificially high numbers and seropositive rates can top 30 percent. The increasing exposure rate could mean the disease is now self-sustaining in Montana elk herds, not just "spillage" from Wyoming. "That's a lot more worrisome," Anderson says.

Exposed elk spreading from the Yellowstone area increase the risk to cattle. Brucellosis was confirmed on a ranch near Bridger in 2007 (although the cattle likely picked up the disease in Paradise Valley) and in Paradise Valley the following year. In response, the USDA revoked Montana's brucellosis-free status (which it reinstated in 2009). The most probable source of infection? Elk.

Concerned about elk herds and beef cattle operations, FWP and state livestock officials have widened the focus of brucellosis management beyond bison, which have dominated discussions and management activities for decades, to include elk. Some Montanans want stronger action. Legislators and lobbying groups have called for

MAP GRAPHIC: FWP; PHOTO BY DIANE HARGREAVES

eradicating brucellosis in Montana elk. Some have gone so far as to recommend widespread culling to eliminate elk where the wild ungulates mix with cattle.

State officials say disease eradication is not viable. Elk are so numerous and range so widely that delivering a vaccination would be impossible. And existing vaccines don't work well on elk anyway. Because the Department of Homeland Security has declared brucellosis a potential weapon for bioterrorists, vaccine research must be conducted in highly secure facilities costing millions of dollars. "For that reason, very little brucellosis vaccine research is going on," says Marty Zaluski, state veterinarian at the Montana Department of Livestock. Pharmaceutical companies haven't jumped into brucellosis vaccine research either, largely because costs could be huge for a product with a relatively small market.

As for the idea of culling elk herds, that doesn't sit well with wildlife officials and conservation groups. "We strongly oppose any proposal to capture and slaughter elk that test seropositive," says Glenn Hockett, president of the Gallatin Sportsman's Association. FWP's Anderson adds there is no proof that the capture, test, and slaughter approach successfully eradicates brucellosis in elk. "Even if it did work, it would be extremely expensive and hugely unpopular with hunters," he adds.

Another controversy has surrounded the Montana Department of Livestock's recent decision to establish what it calls a "designated surveillance area" (DSA) in parts of the counties adjoining Yellowstone National Park where FWP scientists have documented seropositive elk. The good news for the livestock industry is that, under new APHIS rules, Montana ranchers won't lose their coveted brucellosis-free status if diseased cattle are found inside the surveillance area. What's more, when an exposed cow shows up inside the surveillance area, the owner doesn't have to lose the entire herd.

The bad news is that ranchers inside the zone must test their livestock for the disease more frequently than before. And though the possibility of having to slaughter a cattle herd no longer looms, a cow that tests positive for brucellosis can still hurt a ranch's finances, says Druska Kinkie, who ranches in Paradise Valley inside the DSA. She points out that if a cow tests positive in spring, the entire herd must be quarantined, perhaps for months. No animals from the herd, except steers, can be sold until the disease is cleared up (by removing, over time, the infected cattle). Meanwhile, the quarantined cattle must be fed expensive hay while summer pasture goes ungrazed. "You're just stuck there with all your animals," she says.

MANAGING THE RISK

With neither vaccinations nor test-and-slaughter options available, state livestock and wildlife officials, the beef industry, and conservation groups are focusing efforts on "risk mitigation." That means finding ways to reduce opportunities for cattle to contract brucellosis from elk. "If we can't eliminate brucellosis in wildlife—which we feel pretty strongly we can't—then we need to manage around it as a long-term endeavor," says McDonald. Adds Zaluski, "Our main goal is to protect the livestock industry in Montana. It's not us against politicians, or against elk and bison, or against FWP. It's us against brucellosis."

> **"As a hunter, I don't want to see elk on feed grounds any more than ranchers do."**

One challenge to reducing risk is that late winter, when brucellosis transmission is most likely, is also when ranchers feed cattle to get them through Montana's tough winters, and the hay they put out also attracts elk. "As a hunter, I don't want to see elk on feed grounds any more than ranchers do," says Hockett. Another challenge is that growing numbers of wolves in mountainous areas could keep elk at lower elevations longer than normal. And then there are the massive elk feed grounds in Wyoming. Though closing them down might help reduce the disease in elk, Wyoming has rebuffed calls to do so.

FWP officials say that among the biggest obstacles to managing brucellosis risk are landowners who close their ranches to public hunting and let large herds of elk congregate, known as harboring. The property owners close access because of past problems with hunters or to profit by providing exclusive hunting access. Without public hunting to help reduce or disperse herds, elk numbers unnaturally grow to the point where the risk of brucellosis spreading within herds increases. Higher elk concen-

LEGISLATIVE DIRECTION In 2011, Montana legislators authorized FWP to hire staff and spend money so the agency can better understand how elk transmit brucellosis, critical for reducing the risk of transmission to livestock.

Scott McMillion of Livingston is a freelance writer and senior editor for Montana Quarterly.

STEVE LOVAS

trations could also lead to more mixing with cattle during late winter and early spring, when elk abortions and births take place. "We strongly believe that the loss of public hunting access may be increasing the brucellosis risk to cattle," says McDonald.

State agencies and ranchers have begun exploring various techniques that could reduce opportunities for cattle to come into contact with brucellosis bacteria. Herd dogs can drive elk from cattle feed grounds. Portable fencing can separate cattle and elk at critical times. Horseback riders, such as a few employed by FWP, can keep livestock and wildlife segregated. Kinkie says her family has increased fencing, and an FWP herder has done a good job hazing elk away from their beef herd. Fortunately, their ranch abuts Dome Mountain Wildlife Management Area, giving elk a place to go. That isn't an option everywhere. In some areas, she says, "you're just chasing them onto the neighbor's place."

Other ways of reducing risk include improving elk habitat in key areas to draw the wild ungulates away from ranches. Wildlife biologists also can work with ranchers on the timing and location of cattle grazing. And more ranchers who've closed land to public access can open gates so hunters can help disperse oversized elk herds. "We will assist those landowners in managing hunters and coordinating hunts," McDonald says.

Maps are another tool. Using previous information gained from elk blood samples sent by hunters, FWP has mapped where seroprevalent elk exist in the Greater Yellowstone Area. Other maps show the relative probability of elk and cattle mixing in various parts of that area. The maps are available to livestock operators to help them make decisions about where they might want to restrict cattle movement in late winter and early spring.

FWP's five-year study aims to inject more hard science into the discussions and decision making. To keep the study going will require cooperation among landowners, state and federal agencies, and wildlife advocates. Unfortunately, too often discussions about brucellosis, cattle, and wildlife have deteriorated into name calling, finger pointing, and taking entrenched positions.

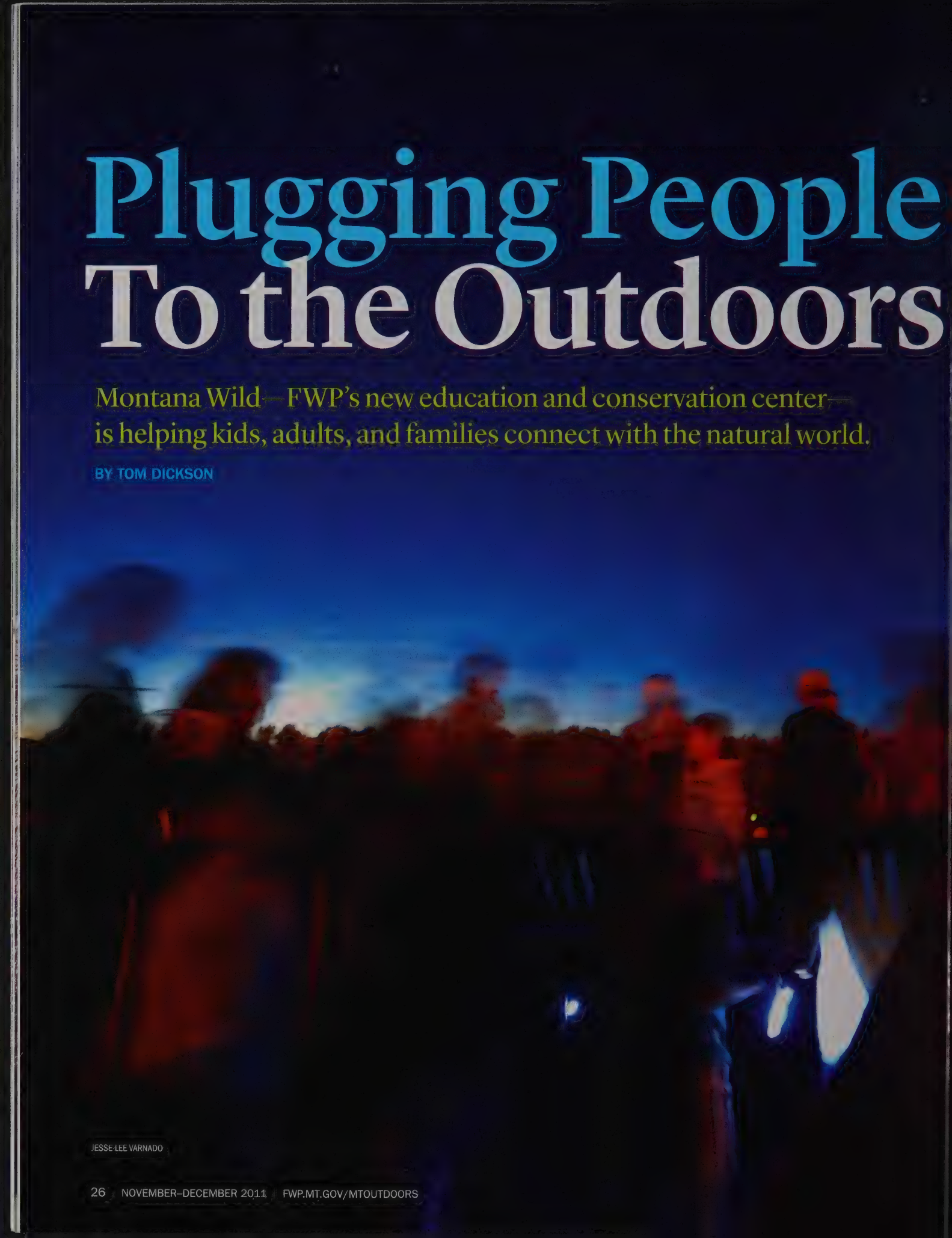
That won't solve anything.

But with enough research, knowledge can increase. And knowledge can, if nothing else, reduce risk.

Plugging People To the Outdoors

Montana Wild—FWP's new education and conservation center—is helping kids, adults, and families connect with the natural world.

BY TOM DICKSON



JESSE LEE VARNADO

TWILIGHT FLIGHT Kids and adults watch little brown myotis and other bat species swoop overhead during an evening seminar at Montana Wild. The new conservation and education complex, built on the capital city's outskirts, aims to provide opportunities for people to learn about nature and build outdoors skills. The ultimate goal? Promote stewardship of Montana's wildlife and wild places. Right: A demonstration raptor holds the attention of a young visitor.

On a midsummer afternoon, bikes lean against the Montana Wild education center, while inside a dozen kids listen intently as Montana Fish, Wildlife & Parks wildlife specialist Tamie Laverdure talks about potential dangers posed by grizzly and black bears. It's summer school, with a wild twist.

As part of her introduction to bear biology, Laverdure holds up skulls of the two species to show the difference in size, and the kids marvel at the big teeth and wide jaws. Then the class heads outside.

There, Laverdure has set up hands-on stations for learning how to recognize bear sign, use bear pepper spray, and hang food high from a tree. One demonstration campsite, litter free with food safely stored in bear-proof containers, shows how not to attract bears. Another site is a bear magnet, and the kids know it.

Laverdure asks what they see that would attract black bears and grizzlies. "Toothpaste in the tent." "Frying pan left out with grease in it." "The cooler is wide open." Laverdure points out that bears can be dangerous—even deadly—but encounters can be greatly reduced if people store food properly and understand basic bear behavior.

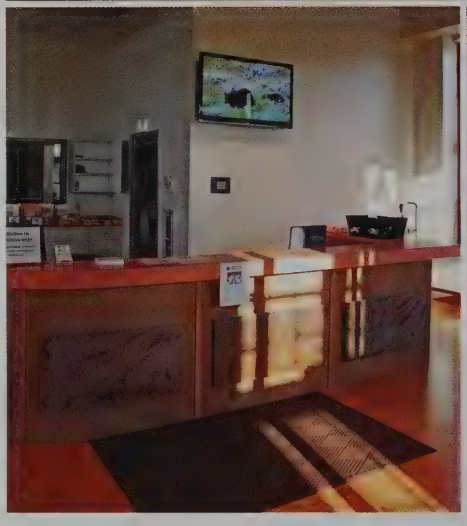
These kids are realizing they can safely recreate in bear country. By taking a few sensible safety precautions and paying attention to the surroundings, they and their families can relax and enjoy the outdoors.

Montana Wild was created in part to help alleviate apprehension about the outdoors—as well as to build outdoors skills, assist teachers, and advocate for conservation. Joe Maurier, FWP director, says the new center's ultimate goal is to promote stewardship of the land, water, and wildlife that support hunting, fishing, camping, hiking, and other outdoors recreation. "Sustaining natural resources requires people who care about the outdoors," he says. "But that can only come from having a connection with the natural world. Montana Wild is a place that will help people make that connection, where they can learn about the outdoors so they can get out there and experience it for themselves."

The Montana Wild education center occupies a refurbished historic limestone block building, originally built in 1892 (see sidebar, page 31), that overlooks scenic Spring Meadow Lake State Park. Next door is the wildlife center, where a coordinator and volunteers care for injured and orphaned raptors, bears, and other wildlife before release back into the wild. The Montana Wild complex also includes a disabled-accessible fishing dock, shallow waters where kids can look for water bugs and minnows, and a 25-yard archery range.

KENTON ROWE

Funding to acquire and refurbish the complex came from state and federal grants, insurance reimbursements, some fishing and hunting license revenue, and, perhaps



LEARNING CENTER Headquarters of the Montana Wild complex is the education center (above), housed in a restored historic foundry. Inside is a reception area (left), meeting rooms, and an auditorium containing a "living stream" with live fish. Displays and interactive features now under construction will showcase Montana's landscapes and conservation traditions. Another feature is the science laboratory (right), where kids can examine water plants and insects. The laboratory is one of many ways Montana Wild works with teachers to promote Science, Technology, Engineering, and Mathematics (STEM) education.

most important, the Helena-based Foundation for Animals (formerly the Mikal Kellner Foundation). For two decades the nonprofit group has worked with FWP to create a state-of-the art center for wildlife and education.

The 7,000-square-foot center houses public meeting areas, a science laboratory, and a central auditorium containing a "living stream" exhibit with live trout, longnose suckers, sticklebacks, and other species. By late summer 2012, the hall will brim with interactive exhibits that celebrate Montana's wildlife and explain how the state's many abundant populations came about. "Visitors will come here and get a sense of the mystique of bears, elk, mule deer, bull trout, sauger, and other wildlife," says Thomas Baumeister, assistant chief of FWP's Communication and Education Bureau. "At the same time, they will actively learn about what it takes for wildlife to live and survive on the landscape—and why individual Montanans have stepped up to help conserve those resources. It's the story of what we have in Montana and how we got here."

Tom Dickson is editor of Montana Outdoors.

Opportunities to connect

On a March evening, three experienced hunters are waiting inside the center to see if anyone will show up for Montana Wild's first outdoors recreation seminar: "An Introduction to Hunting Wild Turkeys." Shortly before the scheduled start, all chairs are still empty, and the presenters joke nervously that they may end up going home early. But within minutes dozens of people are streaming into the room, and it soon fills to capacity. After the one-hour presentation on hunting equipment and strategies, audience members crowd around the experts asking questions.

Afterward Baumeister, one of the presenters, is clearly pleased. "Honestly, we had no idea if even one person would show," he says. "Seeing a turnout like this is great. It's exactly what we hope will happen again and again."

So far, it has. Seminars on bighorn sheep, turtles, bears, bats, amphibians, and northern goshawks this past summer attracted hundreds of people who previously had no way to directly learn from and interact with biologists and other experts. "We wanted the center to provide opportunities for people to connect with nature through a greater understanding of the outdoors," says Baumeister, "and it's working."

Baumeister, Maurier, and others are counting on those connections to ignite a stewardship ethic that perpetuates Montana's tradition of conservation. Here's why:

Throughout the 20th century, Montana and other states were kept busy restoring

CLOCKWISE FROM TOP: KENTON ROWE; FWP; LUKE DURAN/FWP

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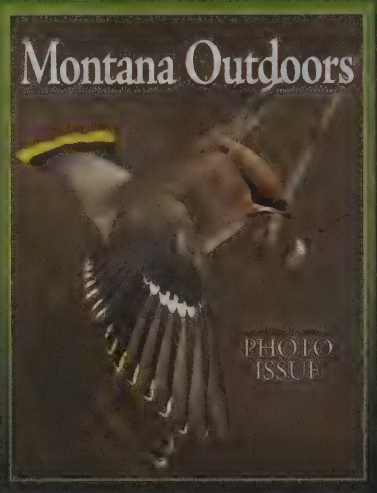

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fish and wildlife populations depleted by overharvest and habitat destruction from a previous era. "Today many populations are recovered," says Baumeister, "and one of the biggest challenges we now face is maintaining public participation in hunting, birding, camping, and other outdoors recreation."

Participation, says Maurier, is a step toward stewardship. "Over Montana's history, the people who decide to help conserve wildlife and habitat are the people who value the outdoors," he explains. "If you don't have that public support and involvement, conservation doesn't work. But that involvement comes only when people actually go outdoors and experience it firsthand. That's really the main purpose of Montana Wild."

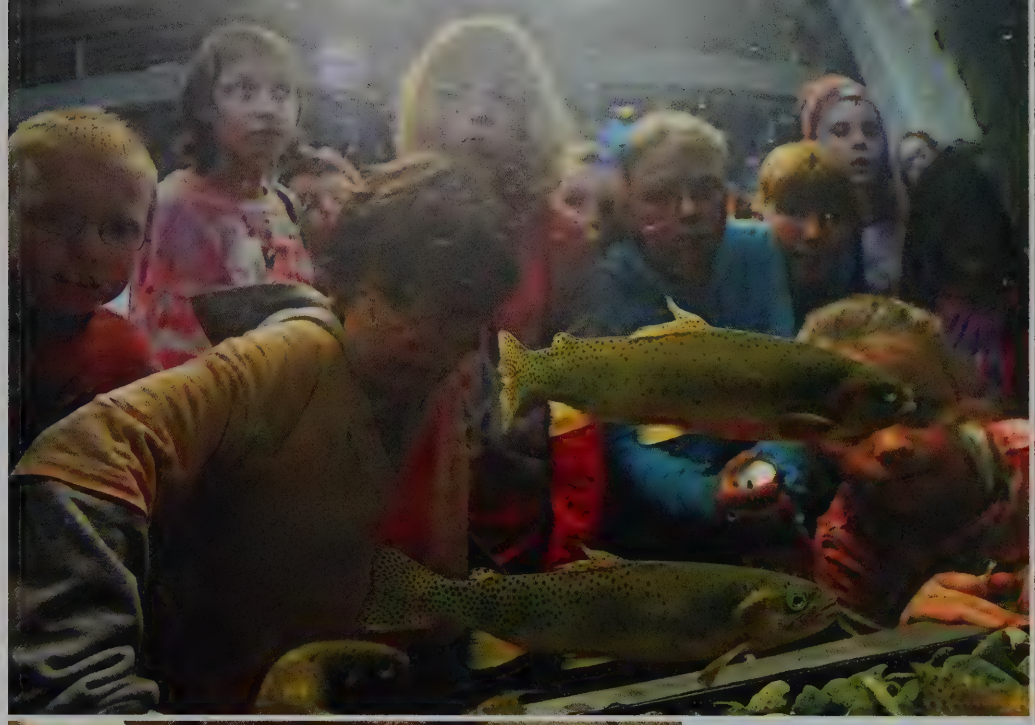
To nudge people outside, the center offers classes on outdoors skills. FWP staff and volunteer instructors teach hunter and bowhunter education, Becoming an Outdoors-Woman courses, and boat and water safety. Visitors can also learn how to fly-fish, train a hunting dog, survive overnight in the woods, and more.

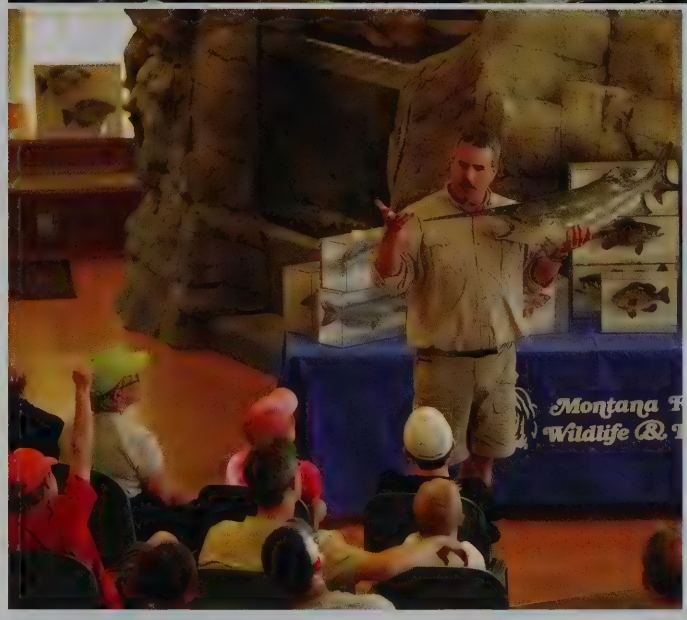
Also offered are instruction and training on how people can coexist with wildlife. Montana Wild provides displays, brochures, and seminars that give campers, hikers, and homeowners practical solutions for things like keeping raccoons out of garbage and bear-proofing their backyard.

"We also want to help people overcome their apprehension of wildlife and wild places," says Laurie Evarts, education center program manager. She notes that as Montana becomes more urbanized, and kids and their parents spend more time indoors watching TV or playing video games, the outdoors can seem like a scary place. "People can't connect with the natural world if they don't feel safe leaving the house," she says.

Value-added education

Montana Wild is also connecting people to the outdoors by incorporating natural history and wildlife science into the state's existing education programs. Kristen Grue is a Helena-based high school science teacher with Access to Success, a diploma-completion program for students at risk of dropping out of high school. This past spring she met with Evarts to set up a project. Access to Success students learned about birds from a





INTRODUCTION, EXPLORATION, RECREATION Students visiting Montana Wild learn about native species such as paddlefish (held here by Aquatic Education Program coordinator Dave Hagengruber). Afterward, they are urged to explore exhibits such as the living stream (top) or shallow water areas outside and begin solving simple scientific problems. Education and skills building, such as angling classes at the nearby fishing dock (below), inspire young people to continue exploring the outdoors on their own.

TOP TO BOTTOM: KENTON ROWE; JESSE LEE VARNADO; JESSE LEE VARNADO

BUILDING SKILLS Montana Wild provides opportunities for learning skills such as shooting a bow and arrow (above, in the new archery center). FWP and volunteer instructors also teach participants how to set up a tent, paddle a kayak, call in a wild turkey, operate a boat safely, and handle a firearm. The Becoming an Outdoors-Woman Program will use the center for classes on fly-tying (right), outdoor cooking, fly-casting, and more. Hunter education classes (below) will also take place at the center and surrounding grounds.

volunteer Helena birder, then figured out where to place bird houses around Spring Meadow Lake State Park to benefit various species. "They loved the project and learned a ton about birds," Grue says. One student later gave a talk on birds and bird houses to a class of middleschoolers, who then monitored the boxes to see if birds were nesting.

In addition to running Hooked on Fishing, Archery in the Schools, and other youth programs, Montana Wild staff work closely with teachers, school boards, and the state Office of Public Instruction on promoting Science, Technology, Engineering, and Mathematics (STEM) education. For instance, students visiting the wildlife center will soon be learning about the science that wildlife biologists use to monitor grizzly bear populations. Students will also find out about science-based professions, such as fisheries biologists who use satellite technology to track trout, or wildlife researchers who study DNA to identify wild animals.

Evarts emphasizes the center "isn't a Friday afternoon entertainment spot" but a place for students to learn and become engaged. "We want to add value to what teachers are already doing and help them meet their educational objectives," she says.

To make Montana Wild accessible to students statewide, the 2011 legislature appropriated $25,000 per year, likely to be awarded as grants, for bus travel from schools to the education center. To give wildlife education a boost elsewhere in the state, Evarts has begun teaching educators how to take kids safely outdoors and incorporate the natural world into math and science lessons.

Ranchers and raptors

Another way people connect with wildlife is by caring about animals in need. That was the case with Jeff Schile, who in March discovered an ailing golden eagle at his family's Lost Lake Ranch near Fort Benton. The raptor was transported to Montana Wild's wildlife center, where its blood was found to contain highly toxic levels of lead, likely from bullet fragments in deer gut piles the raptor had eaten. Lisa Rhodin, a raptor expert and the wildlife center coordinator, says the emaciated, nearly paralyzed eagle was treated with detoxifying drugs by volunteer veterinarians from Apex Animal Hospital in

TOP TO BOTTOM: KENTON ROWE; JEREMIE HOLLMAN; FWP

UP CLOSE AND PERSONAL A visitor eyes the large teeth on a grizzly bear mount at the education center. "We want Montana Wild to get kids excited about wildlife so they begin to explore—safely, of course—this state's amazing outdoors," says FWP director Joe Maurier.

A Remarkable Transformation

Not long ago, the place where today families learn Montana's conservation story and students become inspired about science was a toxic dump.

The Montana Wild complex sits on the site of the Stedman Foundry and Machine Company, founded in 1892 and closed two decades later. In 2001, a chemistry student at nearby Carroll College discovered contaminated soil at adjacent Spring Meadow Lake State Park. State and federal scientists determined that 12 acres of the park and the future home of the Montana Wild complex was contaminated with arsenic, lead, and mine waste dating back to hard rock milling operations a century earlier. Groundwater also was contaminated with toxins. Because the contaminants extended nearly a mile north of the original rock mill, scientists suspect that the gravel mining operation that created Spring Meadow Lake in the 1930s had spread the contaminants.

Stedman Foundry in 1931

To clean up the site for public use, the Montana Department of Environmental Quality (DEQ) oversaw removing, at a cost of $2.4 million, 34,000 cubic yards of soil, which was trucked to landfills. DEQ then re-contoured and seeded the dump site, which today is no longer visible under native grasses and woody shrubs. The soil remediation project delayed by a year the completion of Montana Wild's education center, housed in one of the foundry's refurbished original stone buildings.

"It's a fascinating story," says Thomas Baumeister, assistant chief of the FWP Communication and Education Bureau. "The site was first transformed into a place for some industries that helped Helena grow. Then it sat vacant for decades, and then there is this massive soil remediation project that ends up transforming the land again—but now as a site for public recreation and conservation education."

Baumeister draws two important lessons from the story: "One is the importance of existing environmental laws that prevent something like the soil and water contamination we saw here from happening in the future. The other is that it's possible—though definitely time consuming and expensive—to transform even a highly toxic waste site into a place for outdoor learning and fun."

TOP TO BOTTOM: KENTON ROWE; MONTANA HISTORICAL SOCIETY; LUKE DURAN/FWP

ANIMAL REPAIR BUSINESS Montana Wild's wildlife center takes in orphaned and injured wildlife such as black bears (top), mountain lions (right), and great horned owls (below). The animals are kept away from human contact as much as possible to preserve their wildness. That increases their chance of survival when returned back to the wild, a top goal of the center. New web cameras allow visitors on-site and viewers on-line to see the temporary residents without bothering them. "We're glad to know people care about these wild animals," says FWP official Thomas Baumeister. "That means they are connecting with wildlife and caring about what happens outdoors."

Helena and spent time at the Raptor Rehabilitation Center in Bozeman. In May it was returned to the ranch, where ranch hands and family members watched as Rhodin released the bird back to the wild.

Healing raptors, bears, and other injured wildlife—what Rhodin calls the "animal repair business"—is the primary work of the wildlife center. (Deer, elk, and moose are not taken in, to reduce the risk of spreading Chronic Wasting Disease, nor are small mammals and other common wildlife.) The facility contains a veterinary pharmacy and a hospital room with an operating table and a donated anesthesia machine. Medical work is done by Rhodin, a trained veterinary technician, as well as local veterinarians and technicians who volunteer their time. The facility's two dozen volunteers also clean pens and transport animals. One volunteer even flies his own plane to pick up injured wildlife. "Without this outpouring of public support, we couldn't operate," says Rhodin.

Unlike in zoos, wildlife in the center are not allowed to see people. "These are wild animals going back into the wild as soon as possible," Rhodin says. "We don't want to habituate them to people in any way." Two web cameras enable visitors on-site and viewers on-line to watch bear cubs and other temporary residents. At a new avian perching area, visitors can watch "ambassador birds," resident raptors too injured to survive in the wild.

Recently Rhodin and FWP biologists put radio transmitters on orphaned bear cubs to see how they fare after release. "That's one of the big unknowns in bear rehab. We don't know if they den successfully over the winter, how they forage, how they reintroduce themselves to wild bear society, and if they reproduce," Rhodin says.

As a visitor leaves the facility, he notices several marks on Rhodin's hands and arms. She explains the scars came from years of working with wildlife. "I don't mind," she says. "In fact, the ornerier and nastier they are, the better I like it. That means they're wild enough to avoid humans and wild enough to survive when they get back outside."

It also means the animals are still wild enough to be appreciated and conserved by people who continue to recognize that wildness—in both wildlife and wild places—is an essential part of the Montana lifestyle.

PHOTOS ON BOTH PAGES BY JESSE LEE VARNADO

RAPTOR RESCUE Wildlife center coordinator Lisa Rhodin (center) assists volunteer veterinary technician Chelsey Whenham and veterinarian Matt Blandford in detoxifying a poisoned golden eagle found on a ranch near Fort Benton. A few months later, Rhodin released the recovered raptor back at the ranch, as ranch family members looked on. "People seem real happy there's a facility like ours that's available to help wildlife in need," she says.

Go, Dog, Go!

The tradition and sport of dog sled racing

By Dave Carty

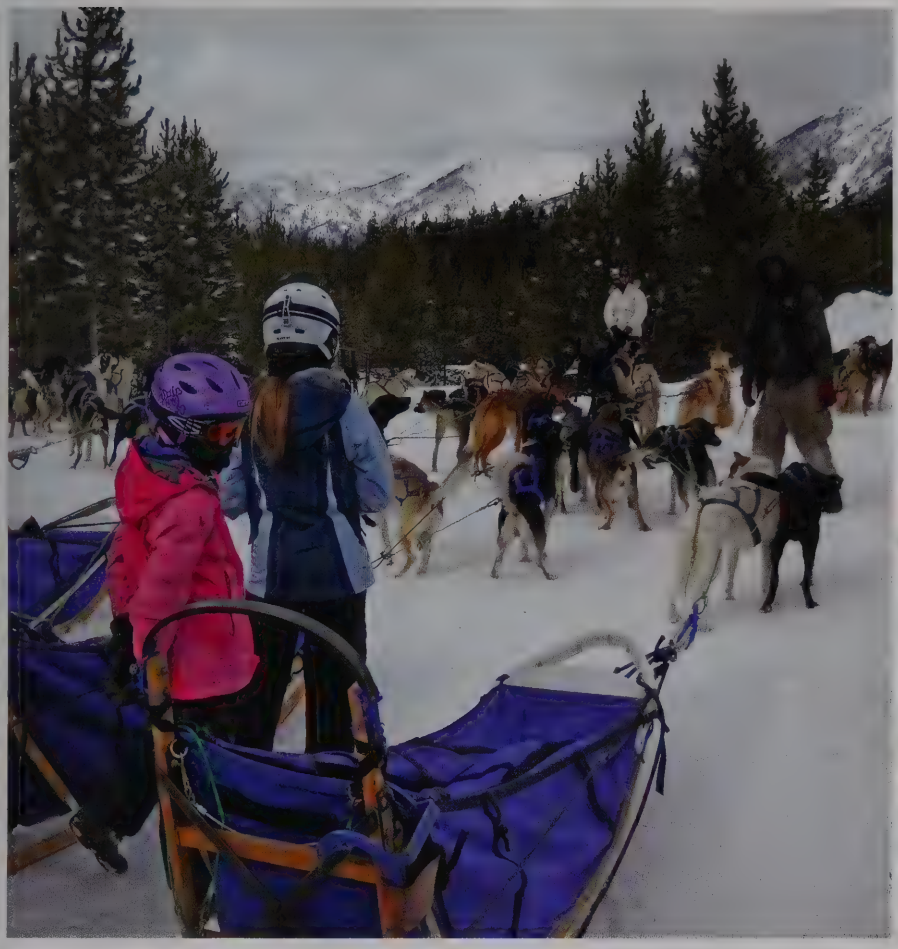
It starts off as background noise: the soft crunch of booted paws on packed snow, the whispering grate of harnesses and sleds being removed from the backs of trucks, a nervous yip. Then it grows: a few scattered barks, increasing in tempo and urgency as the sled dogs sense what's coming. Five minutes from the start of the first leg of the 2011 Race to the Sky, near Butte, the canine cacophony drowns out the howling wind, trucks roaring by on nearby I-15, and the voices of several hundred spectators crowded around the starting line. As each of the dozen 12-dog teams is led to the starting line, the animals are in full cry, wild with excitement, straining to break free and sprint down the trail. For each team, staggered at three-minute intervals, the crowd counts down: "Ten, nine, eight..." As a race official releases the team from its tether, dogs and sled launch into the cold early February air like arrows from a Herculean bow. The dogs press their shoulders into the harnesses, giving voice to their sheer, uncontainable passion for running.

Eager dogs have been pulling sleds across Montana since the 1940s and perhaps long before that. Though no records exist of American Indians using sled dogs here before European settlement, it likely was commonplace. Native people used dogs to transport items throughout Canada when explorers arrived in the late 1700s. An 1833 watercolor shows Indians at the Mandan Village in North Dakota using sled dogs in winter.

Dog sledding as a sport became popular in Alaska, Canada, and some northern states at the turn of the 20th century (the Disney movie *Iron Will* was based on a 1917 race from Winnipeg to St. Paul, Minnesota). But it was not until publication of Jack London's *The Call of the Wild* in 1903 that sled dog lore became part of popular culture.

Montana became the epicenter of American dog sledding in the early 1940s, when the U.S. Army established the Camp Rimini War Dog Training Center, about 10 miles west of the state capital in what is now the Helena National Forest. In *Soldiers and Sled Dogs: A History of Military Dog Mushing*, Charles L. Dean writes that the Dogs for Defense Program was formed to train sled dogs to help with a United States invasion of northern Europe during World War II. Expert mushers from Minnesota, New England, and Canada were recruited to train dogs and military personnel at Camp Rimini. Though plans for the dog-led invasion were scrapped, mushing teams from the center were sent to Newfoundland, Greenland, Baffin Island, and Alaska on search-and-rescue operations.

The sport of sprint dog sled racing in Montana began in the 1960s. Distance events are more recent. Of the several races



CANINE CHAOS A seemingly undisciplined tangle of tethers and dogs at the start of a race quickly transforms into a carefully planned arrangement of lead dogs, swing and team dogs, and wheelers, each with a role based on the animals' skills and temperament.

CLOCKWISE FROM TOP LEFT: NELSON KENTER; PHIL FARNES; PHIL FARNES; MONTANA HISTORICAL SOCIETY PHOTOGRAPH ARCHIVES

held in western Montana each year, one of the oldest and largest is the Race to the Sky, which began in 1986. Paying homage to the state's dog mushing heritage, the Race to the Sky ends or starts a leg of the race each year at Camp Rimini.

Grand marshal of the 2009 event was Dave Armstrong, who ran his first dog sled team in the 1930s and trained at Camp Rimini in 1943. Now 90 years old and retired from the sport, the Helena musher says his love of dog sledding stems from his love of sled dogs, dating to the first malamute he bought as a teenager.

Other mushers express similar sentiments. Though they also enjoy the tradition, the solitude, and the thrill of racing, they do it mainly for the dogs. There's something about harnessing a sometimes motley assortment of Nordic canines together, tethering them to a sled by a single rope, and rocketing out into the winter wilds. Mushers say it's thrilling to be linked to a team of dogs doing something that generations of their ancestors have been bred, born, and trained to do.

Many breeds work as sled dogs. The most common are Alaskan huskies, Alaskan malamutes, and pointer crosses, though any dog with running stamina will work.

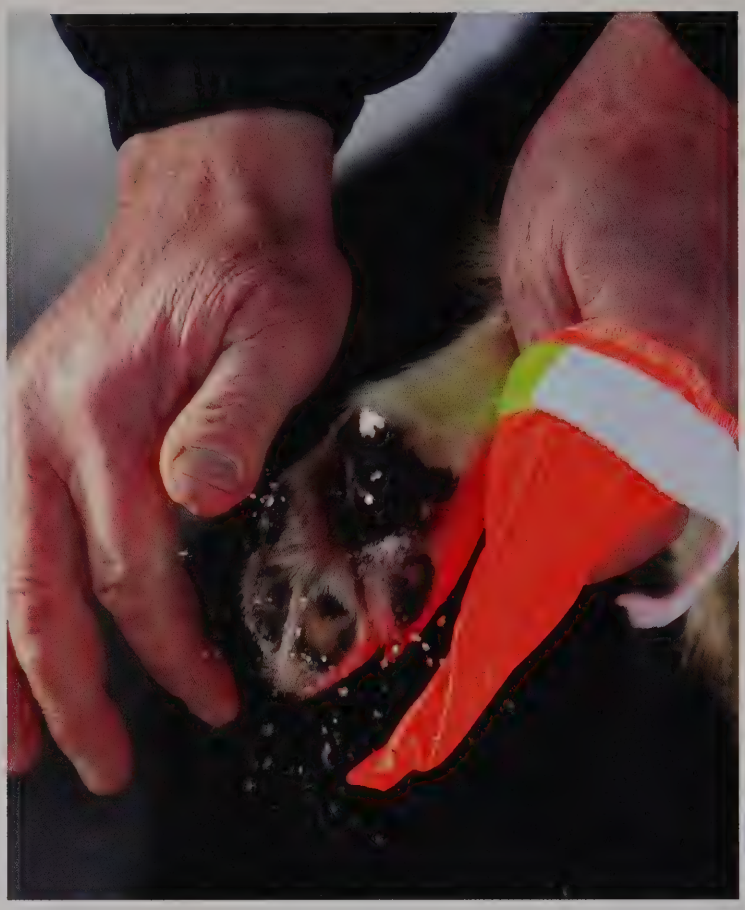
A competitor in this year's Race to the Sky, Laura Daugereau, 28, of Washington, ticks off on gloved fingers the reasons she's in the sport. "It's love of the outdoors, love of the animals, and never knowing what's going to turn up around the next corner," she says. Daugereau, who races her dogs across the western United States, Canada, and Alaska, adds that mushing requires far more work than most people think. "It's not just standing on the runners and watching the beautiful scenery," she says. "You're watching your dogs and helping them up the hills and maintaining the proper speed."

DOGS OF WAR Human and canine soldiers at the Camp Rimini training center, 1943.

Serious mushers

Forty-five minutes before the race starts, Steve Riggs, a mechanic from Olney, Montana, is fitting bright orange booties on the paws of his impatient huskies. They squirm and twist, anxious to run, booties or not. Riggs, 55, explains that a dog without booties can get icy snowballs between its toes, causing discomfort and abrasions.

Like Daugereau, Riggs is a serious musher who enters six or so races each year. He's guardedly optimistic about today's event, his first Race to the Sky. "It's about 350 miles, so this is the longest race we've ever done. I'm hoping to finish and be somewhere in the middle of the pack," he says. He notes that simply completing a race of



CAREGIVERS Mushers use booties to keep painful ice balls from building up between their dogs' toes during a race. Love and respect go both ways.

this length, which lasts four or five days, often in Montana's worst weather, is an accomplishment. "I won't be any threat to the front runners," he adds.

Montana has its share of front runners. The state's mushing superstar is four-time Iditarod winner and Lincoln resident Doug Swingley, who isn't participating today. An up-and-coming musher is 15-year-old Jenny Greger of Bozeman (who later this year will take fifth in Alaska's Junior Iditarod, the highest finish of any rookie racer). Greger, who ran her first dog sled race at age nine, comes from a mushing family. Her parents own Anduril Kennels and her father began dog sled racing in 1991. Jenny says she can't remember when life didn't revolve around a dog sled team. "I was born into the world of mushing," she says. "I started out working some of my dad's retired dogs, but I was never totally into racing until I got my own dogs and raised them from pups."

A common misconception about sled dogs is that the training is too hard on the animals. For instance, during the off-season Greger harnesses her dogs to an ATV and rides behind the team as it pulls against the moving vehicle with varying degrees of resistance. The interval training exercise builds endurance as well as strength, thus reducing injuries. It goes back to the days when sporting dogs—bird hunting breeds in particular—were harnessed to horses for the same purpose. "Some people think the dogs don't enjoy the workout, that we force them to do it," Greger says. "But that's not true at all. I can't force them to go down the trail. If they don't want to go, we don't go."

> "A leader is a smart dog, good at finding the trail, that enjoys the responsibility of leading."

Another mistaken belief is that sled dogs would be happier living indoors. But Greger points out that Siberian huskies commonly spend nights outdoors when it's minus 20 degrees Fahrenheit, to no ill effect. She raises her puppies indoors, however, and regularly brings the adults inside. "They're all house trained and they get to hang out with me," she says. The family's old sled dogs—those past their prime as racers—are allowed to retire as dignified senior citizens. "They're our personal kids," Greger says.

Responsibility is an unwritten rule for those in the sled dog fraternity. Even a small kennel houses upward of two dozen dogs, requiring owners to pay constant attention to the animals. Caring, feeding, training, doctoring, and exercising the dogs is an all-consuming commitment.

To ensure the dogs' welfare during races, the International Sled Dog Veterinary Association regularly checks the animals' health. Race to the Sky veterinarian Sue Geske of Bozeman says the dogs she sees at the mandatory canine check stations are fit and well conditioned. "They're competitive dogs, so they're lean and not carrying extra fat," she says. "But they all need enough fat to sustain them if the weather conditions get worse. A musher knows that if the dogs don't have enough fat, they won't have the reserves to keep going when it starts snowing

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Dave Carty of Bozeman is a frequent contributor to Montana Outdoors.

90-year-old musher the last of a breed

Dave Armstrong, of Helena, competed in the Race to the Sky 14 times before retiring from the sport at age 85. Though he never won the state's premiere dog sled event, he can claim something no other participant can. Armstrong was a young World War II soldier at the War Dog Training Center at Camp Rimini in 1943, where roughly 850 sled dogs were trained for what was to be a military mission, later aborted, in Norway.

Armstrong, who grew up in Massachusetts, bought his first sled dog as a teenager in 1936. He then went to work for a kennel in New Hampshire that supplied dogs for Admiral Byrd's Antarctic expeditions. After enlisting in the Army, he and two other trainers were shipped with 40 dogs to Montana. "It was nice to be working in the Army on something that I knew something about," Armstrong says. The next year he was sent to Newfoundland with sled dogs and pack dogs to set up a search-and-rescue station to recover downed aircraft.

In the 1960s, Armstrong returned to Helena, where he had met his wife during the war, and raced over the years with other members of the Montana Mountain Mushers dog sledding club. After retiring as administrator for the Montana Veteran Affairs Division in 1982, he continued racing before finally retiring in 2006. "The dogs and I were getting too old," he says.

Armstrong says he knows of no other original Camp Rimini soldiers still alive other than his "kid brother" Phil, age 86, who lives in Pennsylvania.

At his house on the outskirts of Helena, Armstrong still cares for a half-dozen sled dogs. In dog years, the animals are as old as he is. "They're all old croakers," he says. "I buried one yesterday that was thirteen and a half years old. They did well by me over the years, and now I want to do well by them."

—Tom Dickson

MONTANA'S SENIOR MUSHER Above left: Armstrong visits with a fellow sled dog enthusiast at the 2008 Race to the Sky. Above right: As a 22-year-old soldier, Armstrong drives a team at Camp Rimini in 1943.

LEFT TO RIGHT: KENTON ROWE; JASON SAVAGE; GEORGE LANE/*INDEPENDENT RECORD*; MONTANA HISTORICAL SOCIETY PHOTOGRAPH ARCHIVES

in the middle of a race and drops to 20 below.

"These dogs do very well in cold weather," Geske adds, "Even when *we* think it's freezing, you can watch the dogs and they're out there happily cruising around in the cold."

Different dogs, different jobs

Randy Camper maintains a kennel of 17 sled dogs in Bozeman. The animals live outdoors in a large fenced enclosure or open-air kennel and are tethered to wooden dog houses stuffed with straw. Camper says the dogs are comfortable, and they seem so despite the chilly temperature. He explains that one reason his dogs live outside is because it's too expensive to build a structure to house them indoors. Another is the dogs like being outdoors. "They'd hate being inside an indoor kennel on a day like today," Camper says, waving his arms in the frosty, 40-degree air.

Camper, who gave up formal racing two decades ago, says he still exercises his team four or five days each week during all but the hottest months of summer. He and many mushers use wheeled sleds in the off- season to run their dogs on low-key races known as "fun runs." Some make a little money on the side taking winter tourists on half-day dog sledding trips, usually in association with a lodge or resort.

Camper starts training his pups at four months, pairing a new dog with an experienced team, figuring out where it will fit in the pack. Lead dogs, in front, steer the team. Next is the swing dog, whose job is to guide the team around corners. Team dogs, in the middle, provide most of the power. Wheelers are last and run just ahead of the sled, which they help guide around corners and pull out when it gets stuck in snow.

Each position requires a certain temperament and personality, explains Camper. "I didn't think this guy in the middle, Pepe, would do well," he says, pointing at a dog. "I had my worries. Last year, though, he started acting like he wanted to lead. And this year he's my single leader."

Cara Greger, Jenny's mother and a veterinary technician, says that leaders are the team "thinkers." She says that contrary to Jack London's Yukon Territory novels, sled dogs don't fight for the front spot in the team. "A leader is a smart dog, good at finding the trail, that enjoys the responsibility of leading," she says.

One of the many things London did get right is that sled dogs have spirit and drive. And that their owners are dedicated to the dogs. I saw that firsthand at the Race to the Sky as mushers spent their last few moments before the race hugging their animals and whispering final words of encouragement before heading out from the starting line in Butte. That night, the dogs and mushers arrived in Camp Rimini, 70 miles to the north. By the middle of the week, after covering a total of 350 miles, the teams crossed the finish line in Lincoln. The winner was Curt Perano, a New Zealander who trains his dogs in northern Minnesota. Daugereau, the Washington musher, was second and only five minutes back. As he had predicted, Riggs finished in the middle of the pack at eighth in the field of 12 teams. And Jenny Greger won the 100-mile Junior Race to the Sky, 16 minutes ahead of runner-up Aiyana Ferraro of Victor.

Making it to a dog sled race finish, or even reaching the starting line, requires enormous dedication. But ask them why they go to all the bother and most mushers will give you the same answer: "For me it's all about being with the dogs," says Jenny Greger. "They enjoy racing, and I enjoy doing it with them."

RECOMMENDED READING

LUKE DURAN/FWP

BY TOM DICKSON

Montana Waterfalls: A Guide for Sightseers, Hikers & Waterfall Enthusiasts

Nathan Johnson and Larry Johnson. Riverbend Publishing, 208 pp. $19.95

Montana is famous for many natural wonders, but waterfalls are not one of them. Yet we have many well worth visiting, from the spectacular, triple-tiered Lodgepole Creek Falls, north of Ovando, to the famous 200-foot Kootenai Falls, near Troy. Son and father writing team Nathan and Larry Johnson spent seven years searching before picking 50 of Montana's most scenic falls for their new guidebook. They packed it with history, nearby camping options, geology, and detailed topo maps showing hiking routes, as well as photos of the featured falls. The authors also rate each waterfall from 1 to 5 for "beauty and impressiveness" and helpfully include icons denoting dangers, places far from medical help, and grizzly proximity. A request to other book publishers: More comprehensive guidebooks like this, please.

Blue Lines: A Fishing Life

Tom Reed. Riverbend Publishing, 170 pp. $12.95

Most fishing books address how to fish. Reed is interested in figuring out why. A resident of Pony who works for Trout Unlimited, Reed is an accomplished essayist who delves into a lifetime of fishing the Rocky Mountain West. He writes about angling with worms as a boy in Colorado, and adventures as an adult fly-fishing small streams—the "blue lines" shown on topo maps. Reed sees fishing as a way to heal life's emotional pains and escape the mundane aspects of everyday living. It's been a while since we've seen books like this by better-known writers such as Nick Lyons and John Geirich. Reed skillfully fills the void.

Montana: Flyfishing Adventures

John Holt. Wild Adventures Press, 257 pp. $24.95

John Holt of Livingston has been writing about Montana fishing for a quarter century. Here he broadens his scope to include species like smallmouth bass, northern pike, and carp, and he also takes readers off the beaten path to catch monster rainbows on the Blackfeet Reservation and 20-inch cutthroats on the Middle Fork of the Flathead. This is a great how-to book, with maps, when-and-where tips, and even advice on fly selection. But Holt's great gift is capturing the feel of a place."Vultures circle overhead," he writes of a scorching hot afternoon on southeastern Montana's Tongue River. "Hell, the bass aren't big, maybe 2 pounds max, but I feel like I'm fishing someplace from a thousand years ago."

Feathers: The Evolution of a Natural Miracle

Thor Hanson. Basic Books, 352 pp. $25.99

This new book by Washington State conservation biologist Thor Hanson is a delight. As the name makes clear, it's all about feathers—their evolution, use by birds, and extremely high value to humans, from quill pens and trout flies to women's hats and Aztec emperor headdresses. Just one fascinating example: The most valuable cargo on the Titanic was not gold or liquor but feathers. The ship contained more than 40 cases of fine plumes, valued in today's currency at more than $2 million.

Float-Fishing Strategies

Neale Streeks. Stackpole Books, 260 pp. $19.95

For the past 15 years, this book has been the go-to guide for anglers wanting to improve their fishing from a boat. Streeks, a Missouri River fishing guide, has written a recently updated version. New to this edition is information on pontoon boats and even more expert advice on avoiding river hazards, rowing strategies for effective fly-fishing, and choosing and outfitting the right boat. A must for anyone whose fly-fishing outfit includes two oars and an anchor.

Flora of Montana's Gallatin Region: Greater Yellowstone's Northwest Corner

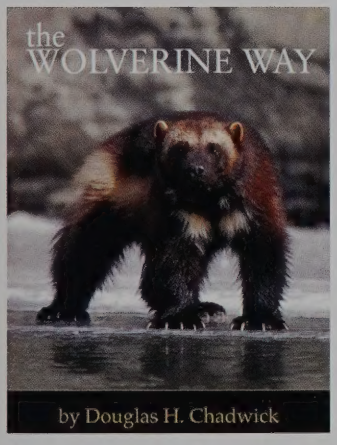
Whitney Tilt. Gallatin Valley Land Trust, 252 pp. $25

With so many field guides to Montana plants already in print, do we need another? In this case, yes. Whitney Tilt's new guide to the flora of the Greater Yellowstone Ecosystem's northwestern region is one of the best we've seen. Descriptions of the 200-plus plants include photos of the flowers, leaves, and fruit, plus icons identifying vegetative zones, native species status, and general size. Tilt, who owns a natural resources consulting business in Bozeman, is not a botanist. That means his book includes only the most commonly seen plants in the region, making the guide more accessible. As Tilt points out, most of us don't need to identify every single penstemon species we encounter.

The Wolverine Way

Douglas H. Chadwick. Patagonia Books, 250 pp. $25.95

Whitefish resident Doug Chadwick has built a reputation for wonderful science writing, and he doesn't disappoint with this riveting tale of chasing North America's rarest and most intriguing furbearer across the frozen wilds of Glacier National Park. Chadwick assists and reports on intrepid researchers who find that wolverines are mind-blowing athletes able to scale sheer mountain walls in midwinter, chase off grizzlies ten times their weight, and survive some of the planet's harshest weather. Chadwick and the researchers also discover surprising behaviors. Wolverines appear to have tighter family ties than previously thought. Researchers found that a mother wolverine and sometimes even a father will allow

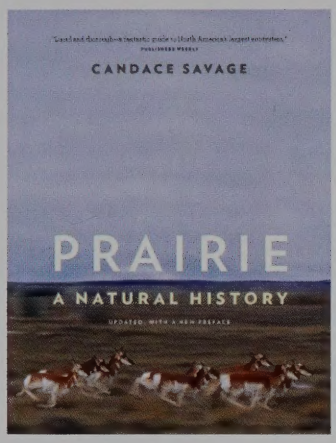


growing juveniles to hang around the parents' territory until they grow strong and smart enough to establish one of their own.

Prairie: A Natural History

Candace Savage. Greystone Books, 306 pp. $34.95

"There are people who think of the prairie as boring, and it is hard not to pity them." So begins the Saskatchewan science writer's homage to North America's Great

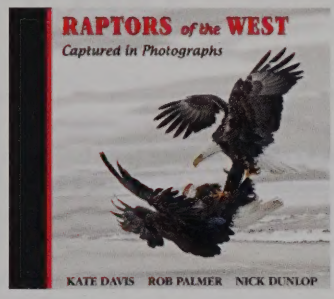


Plains. With stunning photography, lyrical prose, and impeccable research, Savage's book guides readers through the prairie's grasslands, wetlands, rivers, and even riparian woodlands, explaining the wildlife, plants, geology, and climate that embody this vast mid-continental ecoregion. Much of the Great Plains is in trouble, she explains, due to habitat loss caused when wetlands are drained and native grasslands are plowed. "There is no way to hold back the future," Savage writes. "But we can shape the course of events by engaging—fully, deeply, and passionately—with the present....The work is worth doing now, no matter what happens next."

Raptors of the West: Captured in Photographs

Kate Davis, Rob Palmer, and Nick Dunlop. Mountain Press Publishing, 240 pp. $30

The growing legion of amateur photographers with their high hopes and new digital SLR cameras will weep when they see this remarkable collection of raptor photos. Or be inspired to become the next Kate Davis, Rob Palmer, or Nick Dunlop. The three photographers, with text by Davis, provide an extraordinary catalog of stunning raptor images from the Arctic tundra to mature forests to Great Plains grasslands. The cover alone, of two mating bald eagles locking talons in flight, is worth the price. My two other favorites: a prairie falcon riding thermals over a prairie river in Wyoming that captures the sense of flight like none I've ever seen, and an osprey nabbing a trout that feels like it's about to fly into your lap. Usually a book publisher's accompanying press release is filled with hyperbole. But in this case, when Mountain Press Publishing claims, "Bird lovers will swoon," I have to agree, because I did.



I've Never Met an Idiot on the River: Reflections on Family, Photography, and Fly-Fishing

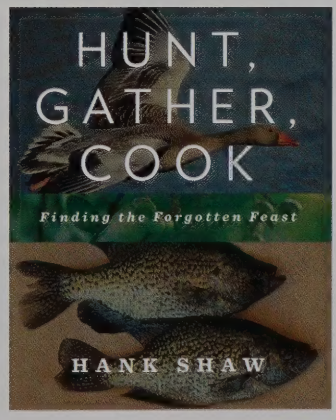
Henry Winkler. Insight Editions, 144 pp. $21.95

This is the strangest—and perhaps most endearing—book to come across our desk in some time. Author Henry Winkler of *Happy Days* TV fame lives in Los Angeles, where he works as an actor and producer. "But my soul lives in Montana, where I fish," he writes. Winkler is no Thomas McGuane, often writing like a teenager gushing over his first love. Yet occasionally his honest, unaffected prose touches upon a deep truth about the sport. "For me, fly-fishing isn't about capturing or conquering or owning the fish," he writes. "It's about sharing a moment in time with a wild creature, feeling its power and merging with its life force for just a brief period." You nailed it, Mr. Fonzarelli.

Hunt, Gather, Cook: Finding the Forgotten Feast

Hank Shaw. Rodale Books, 325 pp. $25.99

I long ago tired of the same old game recipes of venison chili and pheasant baked in cream of mushroom soup, and for years have searched for new and exciting ways to prepare game. So I was tickled recently to stumble upon Hank Shaw's popular cooking blog "Hunter Angler Gardener Cook," as well as his new book on gathering and preparing wild foods. Shaw writes about cooking game without dredging up Betty Crocker–style dishes from the 1940s. An outdoorsman, foodie, and former restaurant cook, he blends the three worlds seamlessly. Especially strong are recipes drawn from across the globe, like Sardinia Hare Stew and Provençal Fish Bisque. Shaw's essay on hunting—aimed at those who don't hunt but might want to learn—strikes to the heart of why many of us do it. "Hunting is more than a pursuit of free-range meat," he writes of himself and his wife. "Hunting has given us a sense of self-sufficiency, a sense of honesty, and a clear-eyed understanding of exactly where our meat comes from."



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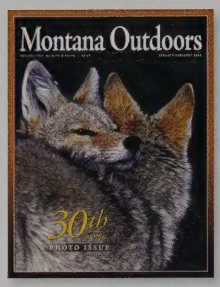

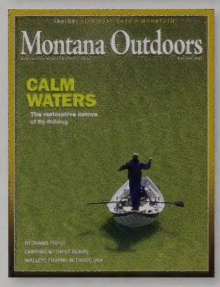

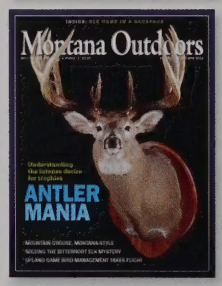

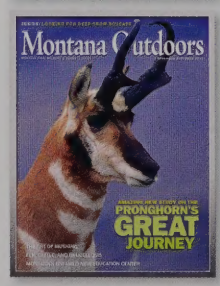

JANUARY–FEBRUARY 2011

Annual photography issue

MARCH–APRIL 2011

The Bighorn's Rocky Recovery After a catastrophic decline in the early 1900s, Montana's bighorn sheep population has grown into one of the nation's largest. But habitat loss, highway fatalities, and deadly disease could send numbers tumbling again. By Tom Dickson

Standing for Montana Strange stories of how the bitterroot, grizzly bear, mourning cloak butterfly, and Montana's other state symbols came into existence. By Sara Groves

The Land That Time Forgot What are West Coast rainforest creatures doing in northwestern Montana? By Ben Long. Photos by David Herasimtschuk

Where Wildlife Reigns Supreme Enjoy the natural splendor of Montana's 21 national wildlife refuges. By Lee Lamb

Straight Aim Students Archery gives kids self-confidence and recreation that can last a lifetime. By Nick Gevock

MAY–JUNE 2011

Elk and Morels Eating the mountain that feeds my family. By Rick Bass

Welcome to Walleye Fishing Expert advice for anglers who are finally ready to branch out from trout. By Mark Henckel

Montana's Redband Trout By Tom Dickson

Bear-Free, Worry-Free Camping Easy ways to ensure that black bears and grizzlies stay away from your family's campsite this summer. By Mike Raether

Searching for Salmonflies Scouring river records for data on Montana's biggest trout bugs. By Dave Stagliano

Check Out This Rod FWP sets up loaner stations for kids who want to fish but don't have the gear. By Ron Selden

Fishing for Serenity How wounded soldiers and other combat veterans find peace with a fly rod. By Tom Dickson

JULY–AUGUST 2011

An Old Friend Comes To Town Though tough on birds and bird feeders, the spread of eastern fox squirrels across Montana gives some of us a glimpse of places we once called home. By Dave Carty

Going to Bat for Bats Why these remarkable winged mammals deserve more public support and scientific study. By Tom Dickson

Stop and Smell the S'mores Slow down to get more from your campground experience this summer. By Becky Lomax

The Spirit Soars Photo essay

Open Space Invaders Noxious weeds crowd out native plants, ruin rangeland, and cost farmers and ranchers millions. How Montana is fighting back. By David Stalling

Crazy About Loons Citizen volunteers and wildlife biologists work to conserve a remarkable bird that spends more time underwater than in the air. By Laura Roady

SEPTEMBER–OCTOBER 2011

The Portable Elk Camp How one hunter improved his backcountry hunting success by employing military reconnaissance tactics. By Dave Stalling

Coveting the Crown What explains the desire to hunt and possess trophy elk and deer? By Tom Dickson

Ready to Go Again A new dog shows promise and helps heal a saddened heart. By Dave Books. Illustrations by Bob White

Grouse of the Forest It takes some hiking and brush busting to reach mountain grouse. But the effort pays off with the fastest wingshooting and tastiest game birds around. By Dave Carty

Arguing with the Trigger Finger It can be terribly persuasive. By Ben Long

Taking Flight New biologists and more public attention are recharging the Upland Game Bird Enhancement Program. By Dave Carty

Return to Camp Musselshell Hunting on the prairie, a dad and his sons find something they thought they had lost. By Craig Jourdonnais

Where Have All the Elk Calves Gone? A new study searches for answers in the Bitterroot watershed. By Daryl Gadbow

NOVEMBER–DECEMBER 2011

Pronghorns in Motion A new study finds that many pronghorn migrate hundreds of miles each year, often struggling to overcome a growing number of obstacles along the way. By Ben Long

Fishing in Snow on the Madison By Verlyn Klinkenborg

Studying Bobcats in Lynxland A research scientist tracks common wild cats rarely found in deep-snow habitat. By Tim Gibbins

Keeping Them Apart How Montana is working to reduce the growing risk of brucellosis transmission from elk to cattle in the Greater Yellowstone Area. By Scott McMillion

Plugging People In To the Outdoors Montana Wild—FWP's new education and conservation center—is helping kids, adults, and families connect with the natural world. By Tom Dickson.

Go, Dog, Go! The tradition and sport of dog sled racing. By Dave Carty

Articles on-line

All stories from 2002–2011 issues are available on-line at fwp.mt.gov/mtoutdoors/.

The complete archives of *Montana Outdoors* and predecessor publications (*Montana Wild Life*, *Sporting Montana*, and *Montana Wildlife*) dating back to 1928 are available on-line at archive.org.

Back issues

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DANIEL J. COX

Northern Pygmy-Owl

Glaucidium gnoma***

By Tom Dickson

* Likely from the Greek *glaukidion*, for "glaring."

** Perhaps from the New Latin *gnomus*, meaning "dwarflike," or from the Greek *gnomon*, "to have knowledge," an attribute once given to owls.

If you live in western Montana and the chickadees at your bird feeder occasionally scatter wildly in the middle of the day, a northern pygmy-owl may be nearby.

Identification

This smallest of Montana owls is only slightly larger than a soda can. It weighs just 2.5 ounces, with females slightly larger than males, and has a 15-inch wingspan. The plump, round-headed bird is mostly gray or brown with white spots on its head, back, and wings; dark vertical marks streak the light-colored belly. The eyes and beak are yellow. When northern pygmy-owls raise their small ear tufts in alarm, they look like miniature great horned owls.

On the back of the bird's head is a pair of dark, oval spots that look like large eyes. The "eyespots" are thought to ward off black-capped chickadees and red-breasted nuthatches that often mob the pint-sized raptor, says Denver Holt, founder and director of the Owl Research Institute, located between Missoula and Flathead Lake.

Tom Dickson is editor of Montana Outdoors.

Feeding

Most species of owls hunt by night and prey almost entirely on meadow voles and other small mammals. The northern pygmy-owl hunts by day, and birds comprise roughly 40 percent of its diet. It also eats small mammals such as squirrels, as well as amphibians, snakes, and even insects.

The northern pygmy-owl attacks a small bird from a perch and grabs the prey with its talons, using its beak to snap the neck. The little owl will attack birds half again as large as itself, including northern flickers and American robins. The owl's adorable face and tiny size belie its ferocity. "Bloodthirsty" and "rapacious" is how nature writer Arthur C. Bent colorfully described this miniature raptor in 1938.

Like other owls, the northern pygmy-owl lacks a crop (expanded section of the esophagus), where it can store food it can't consume right away. Instead, the owl hides remnants of its kill for later consumption.

Habitat and distribution

The northern pygmy-owl lives in a wide range of mountainous habitats, including open and mixed conifer forests, hardwood bottomlands, and wetlands.

The raptor is widely distributed west of the Rocky Mountains from British Columbia to Mexico.

Reproduction

Northern pygmy-owls nest in dead aspen cavities with a diameter of approximately 2.5 inches. Holes of this size are made when branches fall off or by small woodpeckers. Breeding begins in April, when males vocalize from the nesting hole with a *toot*—pause—*toot* call. When a female responds, he finds her and they mate. The male hunts while the female incubates the three to eight eggs.

Owlets fledge (leave the nest) after 30 days and become fully independent 20 to 30 days later.

Status

Though rarely seen except around bird feeders, the northern pygmy-owl is not considered rare or endangered. Populations appear healthy and stable throughout the species' range in Montana and elsewhere in North America—unlike many raptor populations that are declining because of habitat loss and other environmental stresses. One reason is the northern pygmy-owl's diverse diet, allowing it to eat pretty much whatever is available.

"As long as they have cavities in aspen snags to nest in, and forest managers continue to leave diverse sizes of snags, they will probably do okay," Holt says.

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PARTING SHOT

UNDERWATER WONDER Two visitors to Montana Wild watch a smallmouth buffalo, a native sucker species that swims in Fort Peck Lake and the lower Missouri and Yellowstone Rivers. See page 26 to learn what else is captivating kids at the new education and conservation complex in Helena. Photo by Luke Duran/FWP.

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